



Who was James Lind, and what exactly did he achieve

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Who was James Lind?

Visitors to the Edinburgh University quadrangle in Teviot Place, which used to house the Medical School, are unlikely to miss the large plaque put up in 1955 by the Sunkist Growers of Citrus Fruit in California and Arizona. The plaque suggests that James Lind is *The Hippocrates of Naval Medicine*. It then lists three of his four books - 'A treatise of the scurvy',¹ 'An essay on the most effectual means of preserving the health of seamen',² and 'An essay on diseases incidental to Europeans in hot climates'.³ The plaque states that these works led to the conquest of scurvy, the development of modern naval hygiene, and the growth of tropical medicine.

As can be seen, Lind's reputation was high in the second half of the 20th century. Edinburgh University reprinted 'A treatise of the scurvy' to celebrate its bicentenary and the James Lind Library was set up in his name. Yet Lind was little known in 1896 when an anonymous author of an article entitled *Heroes of Medicine: James Lind*, which was published in the medical journal *The Practitioner*, wrote:

*James Lind has been the means of saving innumerable lives and preventing an incalculable amount of suffering; yet even to the members of his own profession today his name is almost unknown. Of his life even less is known than that of Shakespeare.*⁴

We do know what James Lind looked like thanks to a widely distributed engraving based on a portrait by Sir George Chalmers.⁵ Lind appears as a kindly-faced man with intelligent eyes, proudly displaying his four books, with Haslar Hospital in the background. The current whereabouts of the original portrait was discovered through the *James Lind Library*.⁶ It has revealed the splendour

of Lind's waistcoat, not evident in the monochrome engraving, which may influence viewers' perceptions of the man.

Writing about Lind poses significant problems. As the article in *The Practitioner* notes, there is very little primary source material. No cache of manuscript papers full of telling autobiographical detail has ever been unearthed. Another problem for Lind writers is that the historical waters are muddied by an identically named contemporaneous and successful medical cousin - James Lind (1736–1812), physician to the household of George III. Arguably the main problem in researching Lind, however, is the way that the man and the scurvy story have been used as an exemplar by writers with their own biases. Twenty first century researchers can trace many of the Lind misconceptions back to what is probably the most used Lind biographical source - the first (1893) edition of the *Dictionary of National Biography*,⁷ which uses Lind's biography to attack institutional inertia.

The *Dictionary of National Biography* covers most of what is known about James Lind. He was born in Edinburgh on 4 October 1716, the son of an Edinburgh merchant whose wife had medical connections. In 1731 Lind was apprenticed to George Langlands, an Edinburgh surgeon. Some researchers have wondered why Lind did not formally enrol in Edinburgh University. However, during the Edinburgh Medical School's infancy it was common for students to attend lectures on an *ad hoc* basis. Lind is recorded as having attended a course of anatomy lectures in 1734 given by one of the doyens of the Edinburgh medical scene, Professor Alexander Monro *primus*.

After his surgical apprenticeship, Lind joined the Royal Navy in 1738 as a surgeons' mate on a ship captained by Rear Admiral Nicholas Haddock, at a time when Haddock was

successfully attacking Spanish shipping.⁸ In 1740, during the War of the Austrian Succession, Lind joined the 50 gun vessel *Salisbury*. The ship was captained by the influential George Edgcumbe (later first earl of Mount Edgcumbe), who went on to become commander-in-chief of the Royal Navy at Plymouth.

In 1748 Lind retired from the Navy and returned to Enlightenment Edinburgh, where he set up a medical practice in a competitive field. He married Isabel Dickie and they most probably set up home (according to Edinburgh's 1752 tax record) in an apartment in Paterson's Court, in the heart of Edinburgh's old town.⁹ Part of Paterson's Court can be seen today at the top of The Mound, in Lady Stairs Court.

Lind graduated MD in the University of Edinburgh in 1748, choosing venereal disease as the subject for the required thesis, presumably because of his naval experience. In May 1750 he was elected a fellow of the Royal College of Physicians of Edinburgh (RCPE minutes 1.iv.1750). Subsequent minutes of the College show that he attended meetings regularly and the 1756 minutes record Lind's appointment as College Treasurer (RCPE minutes 2.xii.1756). He was also the College's representative on the board of the Edinburgh Charity Workhouse.

It was during Lind's stay in Edinburgh that the book for which he is best known - *A treatise of the scurvy* - was published in 1753, and dedicated to Lord Anson.¹ The following year Lind published a paper in the *Scots Magazine* about the potentially harmful leaching of lead salts from the glazes used in earthenware vessels (1754), and in 1757, his *Essay on the most effectual means of Preserving the Health of Seamen in the Royal Navy*, dedicated to George Edgcumbe (Lind 1757).

In May 1758, Sir Alexander Dick, President of the Royal College of Physicians of Edinburgh, received an elegant letter containing Lind's resignation as College Treasurer and reporting his appointment as Chief Physician to His Majesty's Royal Hospital at Haslar (RCPE minutes 1.viii.1758). The post at Haslar during this period may not have been as prestigious as its title suggests,¹⁰ and it is certainly possible that Lind's medical practice in Edinburgh may not have been as successful as he had hoped it would be. Later that year, Sir Alexander Dick received another letter from Lind, vividly describing the

hospital and precautions against the spread of disease:

Haslar is an immense pile of a building. It will certainly be the largest hospital in Europe when finished ... the hospital is under the direction of a physician and council ... [and] ... No patient is admitted into the hospital until he is stripped of all his clothes and well washed. (RCPE General Correspondence 3.ix.1758)

Lind continued to experiment and publish while working at Haslar.¹¹ In 1762 he proposed a simple method of supplying ships with fresh water by distillation.² In 1763 he published *Two papers on fevers and infection*,¹² and in 1771, *An essay on diseases incidental to Europeans in hot climates*.³

James Lind retired as chief physician at Haslar in 1783, and his son John, who had been his assistant, succeeded him in the post.¹³ Lind died in Gosport in 1794 and appears to have been buried in the grounds of Portchester Church.¹⁴

Lind's *Treatise of the Scurvy*

Scurvy was high on the list of dangers facing those 18th century sailors who spent much time at sea, although some authors suggest that its significance has been exaggerated. For instance in his very comprehensive book on naval history Rodger postulates that '*It has been seriously suggested that a million British seamen died of it in the eighteenth century - a figure which implies that everybody who served in the Navy died of scurvy approximately twice.* Rodger urges caution in discussing a disease whose name was used by doctors as a catch-all term for anything they could not identify or cure. He feels that the real killers at sea were fevers, especially gaol/camp/ship fever (typhus), and malaria.¹⁵

However prevalent scurvy may or may not have been, Lind's *A treatise of the scurvy. In three parts. Containing an inquiry into the nature, causes and cure, of that disease. Together with a critical and chronological view of what has been published on the subject* was clearly regarded as an important book.¹ It was first published in 1753, and appeared in two subsequent editions in English (1757, 1772);

and translations were published in French (1756, 1783), Italian (1766) and German (1775).

Lind's book is long, difficult and contradictory. He uses the work to wrestle with the contemporary theories of the causes of scurvy, and to put forward his own view - that scurvy is a disease of faulty digestion and excretion, exacerbated by environment. He believed there were multiple causes of scurvy, including diet, foul air and lack of exercise.

There are many interesting things in the book, however. For instance, it contains an early example of a systematic review of what had been written on the subject.¹⁶ Lind makes clear in the preface that he prefers observations to theory, and observes bluntly that "*before the subject could be set in clear and proper light, it was necessary to remove a great deal of rubbish.*" In an appendix he describes his use of two early equivalents to *Index Medicus* - Martin Lipen's *Bibliotheca Realis Medica*¹⁷ and Albert Haller's bibliography¹⁸ - to identify potentially relevant material. He identified 54 books meriting critical appraisal, and wrote abstracts summarising his incisive views on each of them.

Crucially, the *Treatise* contains a description of a very early 'fair test' - although the report of Lind's controlled trial comparing six purported treatments for scurvy is rather hidden away and occupies just four pages, unmarked by a subheading, in the 450-page book. Lind reports the trial as having been undertaken in May 1747, while the *Salisbury* was at sea enforcing a blockade in the English Channel.¹⁹ Lind's trial involved twelve sailors with scurvy, who were '*as similar as I could have them,*' who were accommodated in the same quarters (the forehold), and had the same basic diet. His report thus illustrates his awareness of the need to guard against selection bias and shows how he tried to hold potentially confounding factors constant - clinical condition, environment, and basic diet.

Without stating what method of allocation he used, Lind allocated two men to each of six different daily treatments for a period of fourteen days. The six treatments were: 1.1 litres of cider; twenty-five millilitres of elixir vitriol (dilute sulphuric acid); 18 millilitres of vinegar three times throughout the day before meals; half a pint of sea water; two oranges and one lemon continued for six days only (when the supply was

exhausted); and a medicinal paste made up of garlic, mustard seed, dried radish root and gum myrrh.

The most sudden and visible good effects were perceived from the use of 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.

The least satisfactory feature of Lind's *Treatise* is that, despite this apparently strong evidence, Lind leaves his readers confused about his recommendations. Some passages suggest that he is very clear about the implications of his review, for example, when he writes:

Some new preservative against the scurvy might in this treatise have been recommended; several indeed might have been proposed, and with great show of probability of their success; and their novelty might perhaps have procured them a favourable reception in the world. But these (citrus) fruits have this peculiar advantage above anything that can be proposed for trial, that their experienced virtues have stood the test of nearly 200 years.

However, despite the fact that references to the beneficial effects of fruits and vegetables outnumber references to any of the other purported treatments in the trial (Milne and Chalmers 2004), Lind doesn't state clearly that citrus juice is a cure for scurvy.

Lind's second book - *An essay on the most effectual means of preserving the health of seamen*² - contains the chief conclusions of his book on scurvy, with further remarks on the methods of prevention and cure of malarial fevers, and on the problem of sickness introduced into the Navy by men 'recruited' by press gangs.

In the third (1772) edition of the *Treatise*, Lind updated his critical review of the literature, including reference to later writers, such as Nathaniel Hulme. Lind makes references to scurvy cases in the wards at Haslar Hospital.

To what has already been said of the virtues of oranges and lemons I have now to add that in seemingly the most desperate cases the most quick

and sensible relief was obtained from lemon juice by which I have relieved many hundred patients."

However Lind still promotes other remedies, and mentions infusion of malt as a cure for scurvy:

It has the advantages, when newly made, to be extremely palatable. On the whole, it is a very nourishing liquor, well adapted for scorbutic patients.

And in a slightly despairing paragraph Lind outlines his now modified view of the cause of scurvy:

Many diseases have been well known, and accurately described for above a thousand years; yet, for which of them have we an infallible remedy? What medicine can counteract the continued influence of improper diet, air and confinement, the last of which in particular I now judge to be a principal cause of the great obstinacy and frequent mortality of the scurvy in long voyages at sea.

How have later assessments of James Lind evolved?

The dominant 20th century view of Lind is well represented by the précis of David Harvie's 2002 book *Limeys*:

Limeys is the dramatic history of Dr James Lind's heroic efforts to find a cure for the dreaded disease of scurvy in the face of the corrosive patronage and establishment antipathy of the times. Lind recommended lemons and oranges. Yet he was unable to penetrate the Admiralty high-mindedness, or to persuade them to enforce the fruits' universal application. Only in 1795, when court physician Gilbert Blane championed Lind's work, were the Sea Lords persuaded to act.²⁰

It is possible to trace the start of this viewpoint to the 1893 *Dictionary of National Biography*, in which Lind's biographer (Norman Moore MD) wrote that:

... the issue of an order by the admiralty to supply the navy with lemon juice in 1795, two hundred years after it was first known as a specific and forty years after Lind's conclusive evidence of its

worth, supplied Mr Spencer with an effective illustration of administrative torpor in his 'Study of Sociology'. [Herbert Spencer (1820–1903), was an eccentric but influential philosopher, social theorist, and sociologist].

There is little evidence, however, that Lind ever clearly recommended the use of lemon juice to the Admiralty or to others. At least two factors may have explained the failure to make use of antiscorbutics (there were preventable outbreaks of scurvy well into the 20th century). The first reason was practical - the expense and perishability of fruit and vegetables. In response to this problem, Lind used a complicated method to prepare an inspissated juice ('rob'), which has subsequently been shown to contain practically no vitamin C.²¹ The second reason was that researchers had no concept of vitamins - let alone vitamin C - until Frederick Gowland Hopkins's paper on 'accessory food factors' was published in 1912.²²

Lind writes in the advertisement contained in the third edition of the *Treatise*:

The mischief done by an attachment to delusive theories and false hypothesis is an affecting truth, as will appear from a perusal of the following sheets. It is indeed not probable, that a remedy for the scurvy will ever be discovered, from a preconceived hypothesis; or by speculative men in the closet, who never saw the disease, or who have seen, at most, only a few cases of it.

Unfortunately Lind did not follow own advice. He was reluctant to either use or clearly recommend treatments, whose mechanism of action he didn't understand. Lind was not alone. Many other 18th century researchers, including Dr Nathaniel Hulme, Sir John Pringle, Dr David McBride, Dr Thomas Trotter and others, all contributed to the confusion in the second half of the 18th century.²³

Even allowing for the luxury of hindsight it is surprising to discover that Vasco da Gama wrote that, when his sailors were suffering from scurvy in 1498, he sent a man on shore to 'bring off a supply of oranges that were much desired by our sick'. This is reported by Kenneth Carpenter in his magisterial *The History of Scurvy and Vitamin C*.²⁴ Carpenter also quotes Sir Richard

Hawkins who, when scurvy began appearing in 1593 as he sailed near Santos, in southern Brazil, reported that:

There was great joy amongst my company and many with the sight of the oranges and lemons seemed to recover heart. This is a wonderful secret of the power and wisdom of God that hath hidden so great and unknown virtue in this fruit to be a certain remedy for this infirmity.

Although it may be understandable that Lind made no reference to Vasco da Gama or Richard Hawkins, it is surprising that he did not refer to John Woodall, the first surgeon-general of the East India Company, who reported on the anti-scorbutic properties of lemons in his 1617 book *'The Surgions Mate'*. He recommended making sure that *'There is a good quantity of juice of lemons sent in each ship.'*²⁵

In conclusion

Lind is rightly recognised for having taken care to 'compare like with like', and the design of his trial may have inspired Thomas Trotter to use a similar approach.²⁶ Even if Lind's report of a controlled trial may be a fabrication, as some have alleged because his patients did not appear on the ship's sick list,²⁷ his account nevertheless illustrates a way of thinking about how to compare treatments, and this is of historical interest in its own right.²⁸ In a personal communication to the author, the late Sir James Watt suggested that Lind had reported the trial to the Association of Naval Surgeons. Unfortunately this report cannot currently be referenced, but investigation of James Watt's papers archived at the Royal Society of Medicine may contain the answer. Lind is less well known for the systematic approach that he adopted when assessing the reports and opinions of earlier writers.¹⁵ And it should not be forgotten that he reported his experiments to the Royal Society showing how 18th century technology could be used to distil fresh water from sea water,²⁹ a matter of enduring concern to mariners on long sea voyages, even today; or that his *essay on the most effectual means of preserving the health of seamen* was one of the first monographs devoted to occupational health.

References

- 1 Lind J A treatise of the scurvy. In three parts. Containing an inquiry into the nature, causes, and cure, of that disease. Together with a critical and chronological view of what has been published on the subject. Edinburgh: Printed by Sands, Murray and Cochran for A. Kincaid & A. Donaldson, 1753
- 2 Lind J An essay on the most effectual means of preserving the health of seamen, in the Royal Navy. Containing directions proper for all those who undertake long voyages at sea, or reside in unhealthy situations. With cautions necessary for the preservation of such persons as attend the sick in fevers. 2nd, improved and enlarged. London: printed for D. Wilson, 1762
- 3 Anonymous. Heroes of Medicine James Lind. *Practitioner NS* 1896;III:622–625
- 4 Lind J *An essay on diseases incidental to Europeans in hot climates. With the method of preventing their fatal consequences ... To which is added, an appendix concerning intermittent fevers. To the whole is annexed a simple and easy way to render salt water fresh, and to prevent a scarcity of provisions in long voyages at sea.* London: printed for T. Becket and P.A. Hondt, 1768
- 5 Chalmers J *Sir George Chalmers, (c 1720–1791), portraitist of James Lind.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2005 (www.jameslindlibrary.org)
- 6 Peters L, Hepner J *George Chalmers' portrait of James Lind, 1783–2008: a reconstruction.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2009 (www.jameslindlibrary.org)
- 7 Lee S, ed. *Dictionary of National Biography*, Vol 33. London: Smith, Elder & Co., 1893
- 8 Stephen L, Lee S *Rear Admiral Nicholas Haddock Dictionary of National Biography*, Vol 23. London: Smith, Elder & Co., 1890
- 9 Gilhooley J ed. *A Directory of Edinburgh in 1752.* Edinburgh: Edinburgh University Press, 1988
- 10 Birbeck E *The Royal Hospital Haslar: from Lind to the 21st century.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2011 (www.jameslindlibrary.org)
- 11 Tröhler U *James Lind and the evaluation of clinical practice.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2003c (www.jameslindlibrary.org)
- 12 Lind J *Two papers on fevers and infection.* London: D Wilson, 1763
- 13 Peters L *James Lind's descendants.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2006 (www.jameslindlibrary.org)
- 14 Wickenden JVS *The strange disappearances of James Lind.* JLL Bulletin: Commentaries on the history of treatment evaluation, 2011 (www.jameslindlibrary.org)
- 15 Rodger NAM *The command of the ocean: a naval history of Britain 1649–1815.* London: Allen Lane, 2004, 307–308
- 16 Milne I, Chalmers I Documenting the evidence: the case of scurvy. *Bulletin of the World Health Organisation* 2004;82:791–792
- 17 Lipen M *Bibliotheca realis medica, omnium materiarum, rerum, et titulorum, in universa medicina occurrentium. Ordine alphabetico sic disposita, ut primo statim intuitu tituli, et sub titulis autores medici, justa velut acie collocati, in oculos statim et animos incurrant. Accedit index auctorum copiosissimus. Francofurti ad Moenum: cura &*

- sumptibus J. Friderici, prelo Johannis Nicolai Hummii, 1679
- 18 Haller A *Hermanii Boerhaave methodus studii medicae*. Amsterdam: Jacobi Wetstein, 1751
 - 19 Sutton G *James Lind aboard Salisbury*. JLL Bulletin: Commentaries on the history of treatment evaluation, 2004 (www.jameslindlibrary.org)
 - 20 Harvie DI *Limeys: the true story of one man's war against ignorance, the establishment and the deadly scurvy*. Stroud, Glos: Sutton, 2002
 - 21 Hughes RE James Lind and the cure of scurvy: an experimental approach. *Medical History* 1975;19:342–51
 - 22 Hopkins FG Feeding experiments illustrating the importance of accessory food factors in normal dietaries. *J Physiol* 1912;44:425–460
 - 23 Vale B, Edwards G *Physician to the Fleet: the life and times of Thomas Trotter 1760–1832*. Woodbridge: Boydell, 2011
 - 24 Carpenter KJ *The history of scurvy and Vitamin C*. Cambridge: Cambridge University Press, 1986
 - 25 Woodall J *The surgions mate, or, A treatise discovering faithfully and plainly the due contents of the svrgions chest, the vses of the instruments, the vertues and operations of the medicines, the cures of the most frequent diseases at sea : namely wounds, apostumes, vlcers, fistulae, fractures, dislocations, with the true maner of amputation, the cure of the scuruie, the fluxes of the belly, of the collica and illiaca passio, tenasmus, and exitus ani, the callenture; with a briefe explanation of sal, sulphur, and mercury; with certaine characters, and tearmes of arte: published chiefly for the benefit of young sea-surgions, employed in the East-India Companies affaires*. London: Printed by Edward Griffin for Laurence Lisle, 1617, 1617
 - 26 Trotter T *Observations on the scurvy*. London: Longman, 1792
 - 27 Baron JH Sailors' scurvy before and after James Lind – a reassessment. *Nutrition Reviews* 2009;67:315–332
 - 28 Chalmers I, Dukan E, Podolsky SH, Davey Smith G The advent of fair treatment allocation schedules in clinical trials during the 19th and early 20th centuries. JLL Bulletin: Commentaries on the history of treatment evaluation, 2011 (www.jameslindlibrary.org)
 - 29 Lind J The Substance of a Paper read before the Royal Society, being a Letter from Dr Lind to Mr Robinson Master of the Royal Academy at Portsmouth, and FRS. In Lind J (1762) *An essay on the most effectual means of preserving the health of seamen, in the Royal Navy. Containing directions proper for all those who undertake long voyages at sea, or reside in unhealthy situations. With cautions necessary for the preservation of such persons as attend the sick in fevers*. 2nd, improved and enlarged. London: printed for D. Wilson, 1761 pp 85–93