

James Lind, Zheng He and the Prevention of Scurvy

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Introduction

Who really was the pioneer of the prevention of scurvy, that ancient scourge of mariners, the florid deficiency disease of vitamin C (ascorbate in all its guises)? Most history books focus on the role of Scurvy as a feature of the early and, admittedly, great voyages of discovery by European explorers.

For example it was not fear of falling off the edge of the world which drove the crews of Columbus' first voyage to near mutiny but the rising tide of sickness due to the poor provisions aboard. Many of them also knew how badly in error had been his calculations of the circumference of the planet, differing by the equivalent of ten thousand miles from the remarkably accurate estimate of Claudius Ptolemæus, more than a thousand years before.

The voyages of circumnavigation of the globe by Ferdinand Magellan and Francis Drake were plagued by the high death rate due to scurvy. What was remarkable in their accounts was the failure to notice that when they took on fresh provisions from shore at their various ports of call, scurvy abated.

Lind

When James Lind, working at the Royal Naval Hospital at Haslar near Portsmouth, demonstrated that the consumption of citrus fruit by sailors sick with scurvy, cured the disease (*A Treatise on the Scurvy*, 1753), it took nearly forty years for the Royal Navy to accept this as essential practice for long voyages. This, as most students of nutrition know, was the origin of the term "limeys" for British seamen.

Captain James Cook in his wonderful

voyages, did take Lind's lesson promptly to heart. His three expeditions were marked by an unprecedented, to Europeans, absence of scurvy.

By contrast, Captain Robert Falcon Scott in his final expedition to Antarctica failed to apply Lind's lesson. He and his companions for "the worst journey in the world" perished of scurvy, not the Antarctic cold. Accordingly James Lind is usually given the credit for discovering that scurvy could be prevented nutritionally, even though he had no idea of the nature of the protective substance.

However that is an entirely ethnocentric judgment.

The Chinese Voyages

Earlier, long distance Chinese voyagers were almost entirely successful in preventing the development of scurvy among their crews. These included the greatest exploratory fleets ever to sail the oceans - as described in a controversial book by the retired submarine commander, Gavin Menzies (*1421, the Year China Discovered the World*, Bantam Press).

When the third, greatest, and most tragic Chinese Ming Emperor, Zhu Di, took the throne (and the name Yong Le), he had among his loyal, inner circle of eunuch advisors a tall, powerful man named Zheng He. Within a short time Zheng He was promoted to be Commander-in-Chief of what were to become the greatest exploratory fleets of all time. Zhu Di was determined that China would no longer be a land based power (already the most powerful nation on the Earth) but one with a commanding presence upon the oceans.

At this time the Chinese already knew of the nations of Europe, having traded

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with them by land routes (The Silk Road) for well over five hundred years. But such nations were of little real interest to the Chinese since they were known to be backward, impoverished, and by Chinese standards, uncivilized.

Already, by force of trade and diplomacy, the archipelagos of what would later become Japan and the East Indies were vassal states of China. Many other states of Southeastern Asia swore allegiance to the Chinese Emperor as well. This was not hard to do since the Chinese at the time had a long history of religious tolerance. Hindus, Buddhists, Muslims, Confucians, Taoists and Shintoists all lived in peace with each other.

Enormous shipyards were built near Nanjing, including seven huge dry docks - visible even now. An army of crafts people constructed 250 gigantic, nine masted, "treasure ships", so named because of the value of their intended cargoes. Thirty-five hundred lesser vessels were also built, 2,700 patrol and lesser combat ships, 400 larger warships, and 400 large freighters. These last were intended to carry the supplies needed by the fleets.

The "treasure ships" were particularly notable, being the largest crafts ever to sail the oceans of the Earth. Each was about 160 metres long and 60 metres across. The masts, carrying lateen sails, were taller than the tallest buildings ashore. They were steered by rudders 12 metres tall. The hulls were divided into separate watertight chambers, any two of which could flood without the ship foundering. The senior officers and important passengers occupied large staterooms at the sterns of the ships, many of which had balconies.

The purpose of the fleets was not to conquer or colonize but to extend the Emperor's sway across the entire world by the sheer scale of what China could do compared with any other nation. With the excellent astronomical observations

carried out and recorded over the previous thousand years, navigation would be relatively easy, vastly easier than anything that the most educated European could dream about. So exploration and mapping of the whole world was a major motivation.

Preliminary expeditions had already penetrated into the Indian Ocean mapping the coasts of what is now Thailand, Malaysia, Burma, India and Sri Lanka, exploring as far west as Arabia. They brought word back from Arab traders of further extensive coasts across the Red Sea, extending far to the South.

In 1421 under the command of Zheng He the fleets set sail. He had appointed four subordinates, Yang Qing, Hong Bao, Zhou Man and Zhou Wen, each eunuchs like himself, to command the fleets once they had separated.

By the time they reached the Straits of Malacca, Zheng He was well satisfied with the performance of the fleets and their commanders. He sailed back to China to await, with the Emperor, the return of the fleets.

Admiral Yang Qing took his fleet along the coast of Burma, and the east coast of India. He then sailed southwest reaching the coast of Africa near what we call the Cape of Good Hope. Following this route back north he explored the entire east coast of Africa, crossed the mouth of the Red sea, explored the east coast of Arabia, and then, via the west coast of India, returned home.

When he arrived he discovered that disaster had struck. A violent storm had caused a serious fire in the Forbidden City. The Emperor had been forced to surrender the rule of China to the mandarins. They, in turn, saw no future in exploration beyond the bounds of the "Middle Kingdom" and were taking very drastic steps to ensure that no such fleets ever sailed again. They even made the construction of junks with more than three masts a

capital offence, and later did their best to expunge all records of the great voyages of 1421.

Of course the other commanders had no inkling of this.

Following prevailing currents and winds, they rounded the southern tip of India, crossed the Arabian Sea and made landfall at the Horn of Africa. Taking the reverse route to Yang Qing, they sailed south down the east coast of Africa, rounded the Cape of Good Hope, and continued up the west coast of Africa.

If they could have continued further north they would have reached Europe, with enormous historical consequences. However, off shore winds from the Sahara drove them out to sea to the Cape Verde Islands. Here they separated again.

Hong Bao and Zhou Man headed south of west reaching the east coast of what we call South America. Following this coast further south they reached the stormy seas of the tip of the continent. The weather separated them after passage through the straits of Magellan.

Hong Bao's fleet was driven south reaching South Shetland Island within sight of Antarctica. Howling gales drove them back north and then eastward. They entirely missed the southern tip of Africa. Their next landfalls were Heard Island and Kerguelen. By this time they were in trouble, the severe conditions threatening their supplies. However, wild cabbages on Kerguelen saved them. They then reached the west coast of what is now termed Australia. After mapping a part of this region, with no idea that it was an island continent, they set off north, passing between Sumatra and Java, and reached home - to find themselves pariahs.

Zhou Man, however, was able to sail his fleet north from the Straits of Magellan up the coast of South America to somewhere off what we now call Ecuador. Prevailing winds and currents then took him across the Pacific to the west coast of

Australia. He explored this southward, then back into the open ocean again. He reached as far south as Campbell Island before being able to turn northward again, reaching and exploring the west coast of what we call New Zealand. He returned to Australia and explored around the whole of the north coast of the island continent to the environs of the present city of Perth. Then he turned northwards again, sailing east of New Guinea, and west of the Philippines, to reach home again.

There is considerable debate about what happened to Zhou Wen. According to Menzies, he was able to take a route more westerly from the Cape Verde Islands than his colleagues. Apparently, he entered the Caribbean between the islands of Guadeloupe and Dominica, and reached as far west as Puerto Rico. After some disastrous episodes (nothing to do with nutrition, but everything to do with the treachery of the weather) his fleet sailed up the entire east coast of North America from Florida and into the Davis Strait between Baffin Island and Greenland. This being before the fall of the Little Ice Age, the remnants of the fleet could round the north coast of Greenland, cross the Atlantic, and sail along the entire coast of Siberia, before returning home through the Bering Strait.

Fleet Nutrition

How could such stupendous voyages be carried out with little or no evidence of serious sickness, except, perhaps, for Hong Bao's predicament before reaching Kerguelen?

The combined fleets were crewed by about 30,000 people putting an enormous strain upon the nutritional resources. Certainly they traded and foraged for fresh foods at the various ports of call. However the long transoceanic passages would have exhausted such supplies.

One of the fleets carried a historian, Ma Huan, whose diaries (*The Overall Sur-*

vey of the Ocean Shores, 1433) recorded how the fleets solved the problem.

Unlike the ghastly, weevil-ridden, ship's biscuit of the later, British fleets, the Chinese supply ships carried staples of soy beans, wheat, millet and rice, which could be stored for long periods without loss of nutritional value. These could be cooked fresh. As well the ships carried chickens, fed by the above cereals, for fresh eggs and meat.

The soy beans were of particular importance. All the ships carried open tubs in which the soy beans were sprouted under the Sun, developing large quantities of riboflavin, niacin, and, most importantly, ascorbate. Daily consumption of sprouted soy would provide more than enough vitamin C to prevent scurvy.

All of this would have required a

considerable degree of knowledgeable foresight and organization. This could hardly have been developed *de nouveau* for these specific fleets. The Chinese must have known about the prevention of scurvy long before 1421. They would hardly have contemplated such ventures without being certain of their ability to do so.

Not being aware of the scientific method, their understanding of the prevention of scurvy must have come about through a great deal of trial and error through countless voyages of greater or lesser durations.

So the answer to the question of who discovered that scurvy could be prevented is not James Lind nor Zheng He, but someone else entirely prior to 1421.

Who that was is not on record.