The Man Who Saved the Sea

by Lauren Bain

A book review of *Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time,* by Dava Sobel (Penguin, 1995).

Dava Sobel's account of John Harrison's protracted, solitary, intensely focused quest for an objective solution to determining longitude has the precision of an exquisite clock. She writes with the knowledge that her reader is inquisitive and intelligent. She understands that her reader is equipped with a sense of justice and a fascination with science when its principles are explained with splendid clarity.

"Where am I?" and "What time is it?" were pivotal issues until the late-eighteenth century. Renaissance men had mastered the earth's parallels, but its meridians remained a mystery.

"[A] vessel's ignorance of her longitude led swiftly to her destruction," Ms. Sobel states in her crystalline little book, *Longitude.* Thousands of lives, ships, and cargoes were lost every year for want of the knowledge of longitude.

Longitude was the Holy Grail of the eighteenth century; man's quest for his place on the meridians spanned four centuries and engrossed the finest minds of Europe.

Knowledge of longitude makes it possible to plot one's position on the globe. Without knowledge of their longitude, seafarers traveled the parallels, the lines of latitude, often missing their destinations by hundreds of miles. This meant more time at sea, more scurvy and grim deaths, more lost cargoes. Not only merchant ships clung to the parallels; pirates inevitably awaited ships travelling their predictable courses. Longitude was essential to development of secret routes and safe arrival at destination ports.

Latitude is far simpler to determine than longitude. The sun rises at certain points, constellations circle the skies predictably. The earth is neatly divisible along its parallels. Not so along its meridians, which narrow and broaden with one's distance from the equator and poles.

Longitude requires the knowledge of both time at sea and time at home port. We who have grown up reliant on precision quartz technology are far removed from the problems sailors faced when mechanical clocks, susceptible to temperature, moisture, and motion, could be off by several minutes—and longer as the voyage lengthened. A clock charged with maintaining constant home port time simply could not be relied upon to execute its crucial imperative. Lost or gained minutes of time translate into degrees of longitude, and those degrees translate into miles from the intended course. Lost ships are at sea longer, men develop scurvy and die, profits are lost.

The resourceful English obsessed on the problem, and offered a munificent Longitude Prize to the individual who could ultimately produce a precise method for determination of longitude. Count on Britannia, determined to rule the waves, to waive the rules as well.

Two factions evolved in the quest for longitude: the celestial and the mechanical. The celestial quest boasted such adherents as Sir Isaac Newton, Robert Hooke, Christopher Wren (the famous architect designed an observatory for tracking the orbs astronomers deemed essential to longitudinal calculations), and Dr. Edmond Halley. Parliament, the Royal Society, and the Longitude Committee that Parliament had established to oversee testing of proffered solutions all threw their support behind the most respected men of science of their day.

The venerated minds leading the celestial quest focused entirely on the heavens for the solution to the pressing longitude problem. They tracked the eclipses of Jupiter's moons, the transits of Venus, the distances between the moon and the stars, and all manner of arcana invisible to seamen during those occasional bouts of cloud cover and that intrusive phenomenon known as daylight. Despite these obvious limitations, reckoning by the stars won the commitment of leading intellectuals and their royal supporters.

Among the celestials was an arch villain, one Astronomer Royal named Nevil Maskelyne. Maskelyne's contribution to longitude lies in the publication of tables derived by his mentor and intellectual superior, Tobias Mayer. An evilly fatuous boor, Maskelyne deserves to be remembered for his chief contribution: the publication of other people's work.

Mayer's tables reduced the time required to calculate longitude from four hours by the old equations, to thirty minutes—on a clear night.

The mechanical quest was undertaken by a few watchmakers: respected men, but hardly peers of the realm. John Harrison was a carpenter turned clockmaker, and his family origins leaned more toward the "who" than the "blue." Harrison doggedly believed that a clock could be created that would be uninfluenced by moisture, motion, and temperature, and would neither lose nor gain time once set, even on a long voyage. Such a clock could reliably provide the elusive "home port time," which could be readily compared to time at sea. With two reliable clocks on board—the home port clock and the pocket watch the captain set daily to local time by the sun—the difference between time at sea and home port time would be a simple calculation. The difference would tell the seamen the distance travelled in degrees from the home port—in other words, the ship's longitude.

Inherent in the celestial-mechanical dichotomy is the connotation of the relative versus the objective. Celestial advocates saw longitude as a question of where a point on earth was located relative to another heavenly body. They knew that from the heavens would come their revelation.

Mechanical advocates, on the other hand, sought an objective solution: a machine—a clock—made by the mind and hand of man, that could encapsulate and retain time objectively, without interference from weather or conditions of life at sea. The clock would be so accurate that its time, once calibrated, would be relative to nothing; it would be intrinsic to itself. The original time to which the clock was set would be *ascertained* by the stars, but would thereafter operate independently of them.

Star tables required constant corrections and calculation to keep up with *relative* distances. Thus, keeping time by the stars made one forever dependent upon them. A clock measured objective values: degrees from the prime meridian, the man-made starting point for all longitudinal meridians on earth. Man calibrates his clock by ascertainable cosmic events which his mind has the power to capture by invention and ingenuity. The exoteric scientific search for longitude paralleled an esoteric contest between heavenly dominion and the contrivances of man's mind.

Harrison willingly enslaved himself for de-

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