Longitude Essay, Research Paper

Book Review of Longitude

Sometimes all it takes is one man. One man who believes and endeavors. One man who will go against the grain, no matter the odds. In her book Longitude: The True Story of a Lone Genius Who Solved the Greatest Scientific Problem of his Time, published by Walker and Co. in 1995 with 184 pages, Dava Sobell portrays the difficulty of cultivating a means with which to accurately measure lines of longitude in a way many people may never have thought about. Today, it is taken for granted the effort that was put into longitudinal lines. And to shed light on the subject, Sobell has reconstructed a bit of the past. In doing so, she has placed most of the focus on the man responsible for our understanding of longitude today. A man who nearly single-handedly created an accurate measuring system for longitude and developed large advancements in clockwork.

You may be pondering how the two could be related, but the beauty of longitude is that time measures longitude, and so began John Harrison?s work. The problem of finding a measuring system to accurately measure longitude persisted up to and into the eighteenth century, where it reached the pinacle of its debate. It was during this century in which the Board of Longitude was formed in order promote the establishment of an accurate measure of longitude, specifically while at sea. This committee setup a monetary prize of ₤20,000 to the person who could develop a way to measure longitude to within half a degree of accuracy.

Over the course of many years, two distinct approaches to the solution evolved. John Harrison, a loner who pioneered the approach of the craftsmen, headed one approach. It was Harrison who, nearly single-handedly, allowed for the use of timepieces to judge one?s position of longitude. To do so required extremely precise clocks, which at that time, did not exist. Timepieces of the eighteenth century could not accurately endure the fluctuations in temperature and pressure experienced on the open sea. In fact, even the most accurate clocks were off by at least a minute everyday. With the production of his first weather enduring precision clock, the H-1, Harrison paved the way for accurate longitude readings.

Meanwhile, nearly simultaneously, another approach was being developed for the same purpose. This method used the Moon and its relative distance between celestial bodies. This lunar method had required many years to perfect, and only became reliable with the advent of Hadley?s quadrant, an instrument that used mirrors to measure the distances between the heavenly bodies. This instrument, combined with a detailed star chart, allowed a navigator to accurately predict one?s longitude.

Both of these methods gained acceptance, and so began the ?race? to obtain the prize and glory. People continued to improve upon both methods. Soon, Hadley?s quadrant gave rise to the sextant, which included a telescope and a wider measuring arc. These additions made this useful instrument even more precise.

Meanwhile, Harrison, critical of his own accomplishments, continued to improve upon the H-1, and soon produced H-2. While heavier than its predecessor, it was now more accurate and slightly smaller. But Harrison was still not content with his work, and so continued to tinker with another, even smaller version of his famous clock, called H-3. Harrison spent nearly 20 years on this advancement before he finally submitted it for testing. The H-3 included innovations that are still in use today, such as a bi-metallic strip to negate the effects of temperature variance, and a ball bearing contraption to reduce friction between the moving parts.

Yet, despite all these advances, Harrison?s greatest masterpiece was yet to come. Borrowing ideas from a watch given to him by a friend, Harrison began working on his next timepiece. His next work, dubbed the H-4, was finished in 1759 and resembled a pocket watch more than his first three works, which had been clocks. It also did away with the antifriction devices from before. The H-4 was now only 3 pounds (minuscule when compared to the first three) and included jewels such as diamonds in the workings. Harrison immediately called it his ?masterpiece? and thanked God for allowing him to live long enough to produce it.

Though he was finally content with his craftsmanship, Harrison had many years to come of testing and debating before his masterpiece gained exception. The Board of Longitude had favored the celestial means of determining longitude from the beginning, and thus they delayed the spread the H-4 to the public. However, Harrison was recognized by the community of watchmakers for his expertise, and thus began the movement for the construction of an improved, less expensive version of the H-4.

Larcum Kendall was the first clockmaker to copy Harrison?s design. Unfortunately, Kendall was not inventive enough to produce striking new ideas, and in fact excluded some major parts, causing faulty timepieces. Nevertheless, his watches found their way onto voyages to many ends of the Earth.

Thomas Mudge was next to attempt the construction of what was now known as a chronometer. Mudge improved upon some of Harrison?s ideas, but much the same as Kendall, Mudge only produced three such instruments.

John Arnold, however, produced hundreds of high quality chronometers. Being a naturally inventive man, almost to a fault, Arnold produced many different designs and improved much upon the now aging H-4 design. This man was even able to reduce the size of his device enough to truly be called a ?pocket? chronometer.

Perhaps Arnold?s largest competitor, Thomas Earnshaw is credited for ushering in the modern chronometer. With his simplistic innovations of Harrison?s and Arnold?s ideas, plus an element allowing his chronometer to need no oil, Earnshaw, though having a tendency for financial troubles, was still able to produce a nice income from his established factory.

By now Kendall, Mudge, Arnold, and Earnshaw had all received awards for their respective accomplishments. The lunar method of navigating the longitudes had died down. What had once been a competitive model for determining longitude had now been all but forgotten. In its stead rose the chronometer, which in time became an ordinary required instrument on every ship at sea.

In her book, Sobell portrays the timeline of the development of the chronometer in a way that intrigues the reader. The rather short chapters keep the subject concise without too many unwanted details, but long enough to allow a depth of understanding of each topic. Also, the language was not so technical as to make the book tedious to read. This allowed me to sit down and read large portions of the book at a time. I also enjoyed the inclusion of the humorous methods attempted for longitude, such as the wounded dogs; and the inclusion of such shady characters as Maskelyne only seemed to make this book read almost as a story, instead of a historical account.

Many men may have made the chronometer what it is today, but all of these men stood on the shoulders of a man before them. One man. A single man against all odds and all criticism?believing in himself, and his ideas.