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VI. Latitude & Longitude

The Lewis and Clark Expedition in 1803-1806 was not the first nor is it the most recent of mankind's great scientific explorations. Of our time, NASA's manned flights to and 1969 landing on the surface of Earth's moon, as well as its ongoing probes of Mars and beyond, stand out.

Technology of Western Civilization was obviously in a much more formative state in the 15th century when Christopher Columbus landed in the new world. Nevertheless, for its time, the technology at hand was important to the whole fabric of discovery. Moreover, there was even then a technology center of sorts, founded by Prince Henry the Navigator in approximately 1420, at Sagres on Cape St. Vincent in southwestern Portugal. This early "NASA" developed capabilities in cartography, mathematics and astronomy, and fostered trade-inspired navigation with instruments for celestial sightings. Navigation on the open sea, without landmarks on the horizon, was indeed a difficult problem, even with instruments.

The compass for locating magnetic north was already known since the late 12th century. Columbus employed this instrument and dead-reckoning for his remarkably skillful navigations at sea. The sextant (www.edgate.com/lewisandclark/) is a more modern and sophisticated instrument than the earlier astrolabe or quadrant for determining latitude. It was invented in 1731 in England and America independently. Two were obtained by Meriwether Lewis in Philadelphia in 1803 during his visit there to extend his scientific learning and buy articles for the Expedition.

The determination of longitude requires knowledge of local time, which can be determined from a sighting of the sun, relative to that of a reference. Knowing the reference time without an accurate clock or chronometer at hand and running on that time is the problem. The official reference since 1884 is the prime meridian at the Royal Observatory in Greenwich (www.rog.nmm.ac.uk/mill/meridian.htm). There is a fine history about longitude at www.rog.nmm.ac.uk/museum/harrison/longprob.html .

When Meriwether Lewis visited Lancaster in 1803, he was continuing his scientific homeschooling beyond that which he had already received under Jefferson. He received additional training on the use of the chronometer and sextant from Andrew Ellicott, America's leading astronomer of the day. He then continued on to Philadelphia, where Robert Patterson, a distinguished mathematician, furthered the instruction and helped Lewis buy a chronometer for the Expedition. Lewis purchased one for $250, the largest of his expenditures for a single item, and then had Ellicott regulate the clock in Lancaster. Ultimately, mapmaking of the Expedition was accomplished with accumulated data from various measurements.

These instruments were among the most "high-tech" items on the Expedition, and they had to withstand difficult portages and overland hikes. Because of Jefferson's concentration and emphasis on mapping the new lands, their use was a significant part of Lewis's training. Jefferson's extensive reading, scientific knowledge, and association

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with the learned scientists of America made the Expedition the lasting scientific event that it is. He gave new meaning to the use of compass, sextant, and chronometer by employing them over new lands.

Here are additional sources for the Jefferson “Third Library” that I previously imagined, and for you: Morison, Samuel Eliot, “Admiral of the Ocean Sea,” Boston: Little, Brown and Company (1942) and “The European Discovery of America: The Northern Voyages,” New York: Oxford University Press (1971); Sobel, Dava, “Longitude: The Story of a Lone Genius Who Solved the Greatest Scientific Problem of His Time,” New York: Walker (1995).

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