

Miles and miles©

Different miles and how they came to be Under the Roman Empire, Rome became the center of the western world. All roads led to Rome and all distances were measured from Rome. The distances were based upon one-thousand Roman paces of the Roman soldier. A Roman pace is equal to two of our steps and very near 64 inches. The Latin for thousand is mille from which we derived the word mile. Each Roman road had occasional small obelisk statues placed to indicate the distance from Rome much as Mexico today does from Mexico City. Hence, statute miles.

The first paths for ships were called Portolan Charts. These were lines drawn across the Mediterranean between the coastal ports. Where many of these lines crossed the map makers would draw wind roses. The wind rose initially varied but settled on the eight points. The predecessor to the compass rose and our eight wind direction terms.

Thales of Miletus (640-546 BC) made a projection (use of shadows) of the region where he lived. Hipparchus in the 2nd century B.C had used stereographic heights)and orthographic projections (perspective). Eratosthenes in 3rd century B.C. calculated the size of the earth circumference to be 24,000 miles. He developed a 16 point wind rose and use of 'degree". He also wrote a description of the known world.

Ptolemy, a 2nd century Greek, made a world map and made a world size error when he calculated size of world's circumference to be only 18,000 miles. Eratosthenes' calculations had been lost to the western world with the destruction of the libraries of Egypt. Copies of scrolls from Eratosthenes were discovered in Constantinople by Polish researchers but it was over a hundred years before application was applied to nautical navigation. This corrected size of the world was drawn on navigational charts in 1669 by Jean Picard.

Ptolemy used the first conic projection plane map with the top as north. This made possible drawing of rhumb (one direction) lines from point to point on the globe. He devised the 60 minute and 60 second divisions of the 360 degrees in a circle. A mile at sea, on this world of Ptolemy, was essentially equal to a mile on the land.

A 1466 Chart of Nicolaus Germanus divided the degree into 60 equal spaces called miles. This was based upon an earth of 18,000 mile circumference and gave us a nautical mile the same length as a Roman statute mile. Other cartographers including Hipparchus and Mercator gave us a world with an overlying grid with numerical markings of longitude and latitude. Gerardus Mercator (Gerhard Kremer), Flemish, in 1569 drew world globe map with 180 degrees E/W longitude 0 to 90 N/S latitude. He made errors which were corrected by Edward Wright who published the computations required as "Meridional Parts" and made this knowledge universal. In combination, we now had a world which could be mapped in degrees of longitude and latitude. Each degree of longitude had divisions of 60 miles equal to a statute mile and each mile was again divided into 60 units called minutes and each minute was again divided into 60 units called seconds.

This was the kind of map and scale used by Columbus. The navigators of his time had not the timing device to make possible exact determination of longitude. The best 15th Century data available to Columbus came from Ptolemy. The error by Ptolemy directly resulted in Columbus' declaring that he had reached and was exploring India. Columbus thought he had

sailed through enough degrees of longitude to have reached India. He may well have, had the world been 18,000 statute miles in circumference.

When the world was computed to be 24,000 statute miles in circumference all the degrees and their divisions were longer and did not conform. More accurate computation of the world's circumference kept changing and finally came to 24,902 statute miles. The circumference of the earth has always been measured as 21,600 nautical miles (360 degrees X 60 nautical miles per degree). However, the individual nautical mile has ballooned by nearly a third through this recalculation of the earth's size. For many of the same reasons the U. S. has failed to convert to metric, later cartographers decided to use statute miles for land and the expanded nautical mile at sea.

Now we can see the background for the difference between nautical and statute miles and Columbus' reasoning. We have Columbus sailing around an earth at least 1/3 larger than he was led to believe. Based on available knowledge Columbus was quite justified to assume that he had actually reached and explored India.

For the navigator, it is very important that distance only be measured along the lines of longitude which has evenly spaced tick marks throughout. The elongated orange peel appearance of the region between lines of longitude means that various latitude lines will have tick marks at differing intervals although always 60 ticks per degree. Only at the Equator do the tick marks correspond to the size of those along the lines of longitude.

There is a new small pocket book for \$11 that gives an interesting account of how the ability to compute longitude contributed to the growth of the British Empire. The book, "Longitude", tells of the early development of the wooden chronometer capable of keeping time within seconds a month. The early wooden chronometers are still working in Greenwich, England.