November 2014

Ptolemy: 'Geographiae universae'

Reflections on the various works in the exhibit

Imprints and Impressions: Milestones in Human Progress

Highlights from the Rose Rare Book Collection, Sept. 29-Nov. 9, 2014
Roesch Library, University of Dayton

Claudius Ptolemaeus (Ptolemy)
Geographiae universae (Geography)

- 1597
- From the library of Robert Burton

One of our enduring popular cultural myths is that until the Renaissance, the world was believed to be flat. Don't we all somehow have in mind the story that the journey of Christopher Columbus was risky because he was not sure if he would sail off the edge of the earthly disk?

Since at least Eratosthenes in the third century BC, it had been made clear experimentally that the earth is a sphere and in fact that the circumference of the earth could be reasonably well determined. Ptolemy, from the second century CE, set about the next step in recording what was known about the world by creating a map of geographical features. His goal was not so trivial since he had to figure out how best to accurately represent the surface of a three-dimensional sphere on a two-dimensional plane.

Ptolemy set up a system of latitude and longitude, and once he had a length scale, he was able to locate cities, mountains, and landforms on his map. Independent of how we might now regard the accuracy of the maps shown in the *Geographiae universae*, it is the intellectual feat of trying to make a realistic transposition of the known world (and he was aware, apparently, that much of the globe was simply unknown to him) to a flat page that we should admire.

In many ways, Ptolemy was many centuries ahead of his time. One need only think of the*Mappae Mundi* of the Middle Ages, highly distorted (from our point of view) allegorical representations of the world, to realize that 1,000 years or more after Ptolemy, there was little perceived need for sophisticated mapping techniques. Although Ptolemy was not the first to apply mathematics to mapping, it was more common to present maps such that more important features were larger. The often-used Mercator projection exaggerates dramatically the apparent size of landforms near the poles, for example. In this view, present-day Alaska appears to be the same size as Brazil, whereas Brazil is several times larger in area.

Just as Ptolemy's cosmology as set forth in the *Almagest* was the reigning theory until Copernicus, Galileo, Kepler, and Newton roughly two millennia later, the *Geographiae universae* set the tone for mapping for at least a similar length of time. Except for important fine-tuning of distance scales and the filling in of blank spots on the earth's surface by further exploration, mapping remained little changed. In fact, one might say that the biggest breakthrough in mapping did not come until the advent of GPS (global positioning systems) in the late twentieth century, with which positions could be determined instantaneously using a set of orbiting satellites—a technology that was not possible without the application of Einstein's general theory of relativity.

—Robert Brecha, PhD, Professor, Physics