

## Maps & Minds

Throughout time, maps have expressed our understanding of our world. Human affairs have been influenced strongly by the quality of maps available to us at the major turning points in our history.

"Maps & Minds" traces the ebb and flow of a few central ideas in the mainstream of mapping. Our expanding knowledge of our cosmic neighborhood stems largely from a small number of simple but grand ideas, vigorously pursued.

Over one hundred years ago, Major John Wesley Powell, the second Director of the U.S. Geological Survey and a member of the scientific community that founded the National Geographic Society, proposed making a *Topographic Base Map of the United States*. That was the beginning of our National Mapping Program.

This exhibition began as a centenary celebration of the vigorous pursuit of Major Powell's idea. Sponsored by the U.S. Geological Survey and the National Geographic Society, the exhibit visited ten cities and was seen by 165,000 people during its first two-year tour. In this second national tour, it is hoped that visitors continue to find the exhibit enriching and informative—inspiring pride in our achievements as we attempt to get *from here to there*.

## The Beginning

We do not know when we began making maps. Mapmaking developed at different times in different areas of the world.

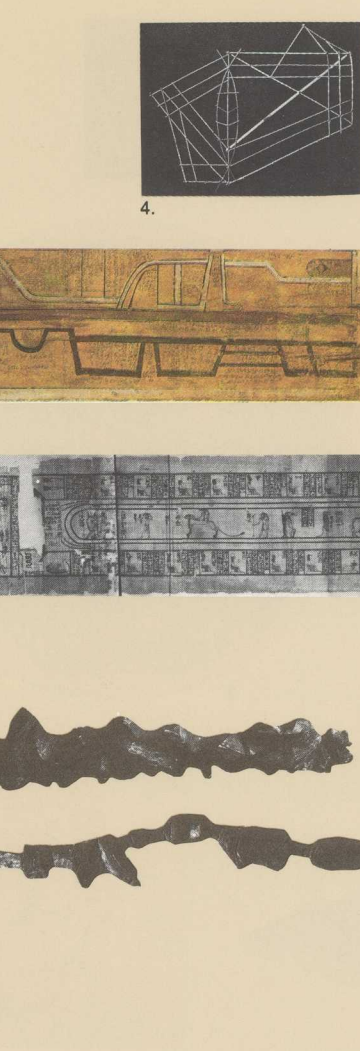
The earliest known relics of maps are from Mesopotamia—many were based on surveys. Some of these early maps on clay tablets and boundary stones were topographic maps and some were cadastral maps showing property ownership for taxation.



1. **c. 2500 B.C.**—Babylonian topographic map. Courtesy of the Harvard Semitic Museum.  
2. **c. 500 B.C.**—Babylonian world map on clay tablet. Courtesy of the British Museum.  
3. **A.D. 900-1300**—Petroglyphs, "Newspaper Rock," Utah. Photograph by Robert Moore. Courtesy of the National Geographic Society.

The oldest topographic map relic was made in Babylonia in about 2500 B.C. The Babylonians may have been the first to make a map of the world in 500 B.C.

The Egyptians surveyed land, marked boundaries, and taxed property. They developed surveying tools to aid in their mapping.



4. **1900s**—Marshall Islands navigational stick chart. Courtesy of the Smithsonian Institution, Department of Anthropology (#32924-A).  
5. **c. 2000 B.C.**—Egyptian sarcophagus painting. Courtesy of the Library of Congress, Geography and Map Division.  
6. **c. 323-30 B.C.**—Fayyūm Egyptian papyrus scroll drawing of the afterworld. Courtesy of the Walters Art Gallery.  
7. **c. 1880s**—Greenland Eskimo carved relief maps. Courtesy of the National Museum of Denmark.

## The Thinkers—Greeks

All we know of early Greek maps is what is written, but that formed the basis for the development of our cartography and influenced Western mapping for centuries.

The Greeks reasoned that the Earth is a sphere, and Eratosthenes measured its circumference.



1. **Alexander the Great (356-323 B.C.)**—Greek coin from Thrace issued 323-281 B.C. Courtesy of the Smithsonian Institution, Department of Numismatics (#70/33).  
2. **Eratosthenes** measured the circumference of the Earth c. 250 B.C. (Schematic, not to scale).  
3. **The world** as it was known to Eratosthenes. Map from an 1879 work on ancient geography. Courtesy of the Library of Congress, Geography and Map Division.

Ptolemy compiled and systematized geographical knowledge in his two great works, *The Geographia* and *The Greatest*. Ptolemy's concepts, right and wrong, have influenced cartography and history to this day.

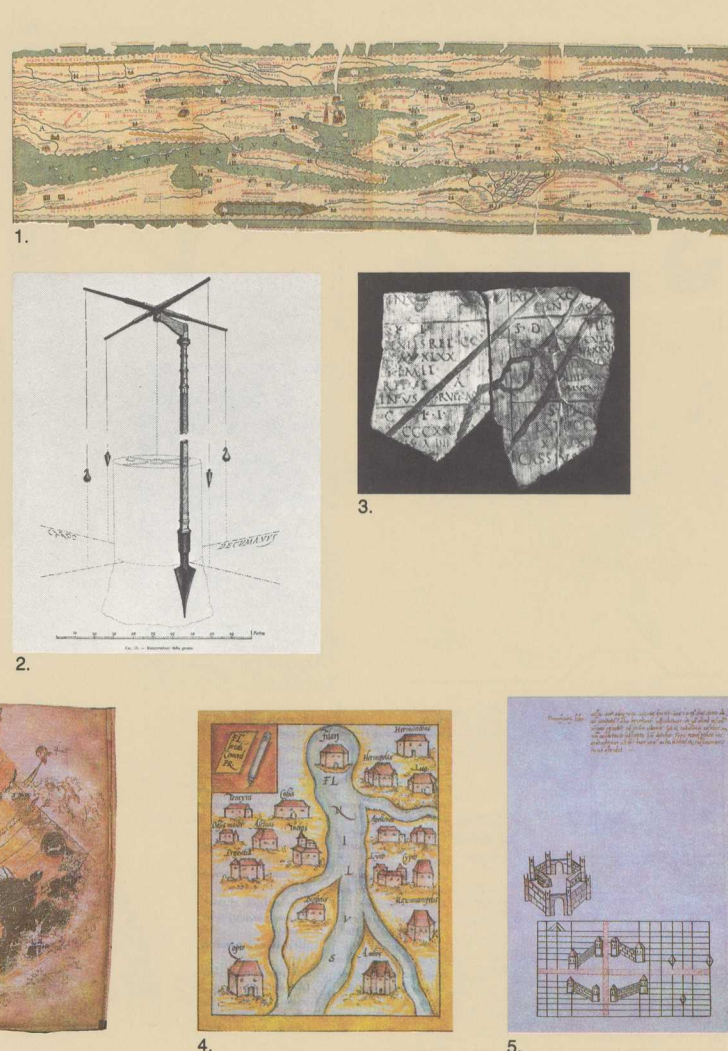


4. **Claudius Ptolemy (A.D. 90-168)**—Greek portrait from *Portraits et Vies des Hommes Illustres*, 1584. Courtesy of the Smithsonian Institution, Diner Library.  
5. **"Vatopedi" world map**—13th or 15th century manuscript map based on Ptolemy's concepts. Courtesy of the British Library.  
6. **Surveying treatise page**. Attributed to Hyginus Gromaticus. Sixteenth-century copy. Courtesy of the Biblioteca Apostolica Vaticana.

## The Builders—Romans

The Romans were colonizers, builders, and administrators. Also, they were surveyors and mapmakers.

They made the first known road maps. They made cadastral maps for taxing their conquests, boundary maps, town maps, and schematic maps illustrating classical texts.



1. **A.D. 250-500**—Peutinger Table. Two segments of a medieval copy of a Roman itinerary map. From published facsimile, courtesy of the Library of Congress, Geography and Map Division.  
2. **1st-century Roman groma**. Drawing of groma excavated in surveyor's workshop in Pompeii. Courtesy of the Library of Congress.  
3. **A.D. 77**—Orange Cadaster A, fragment 7. Relic of monumental cadastral map. Photograph by Abel. Courtesy of the Musée d'Orange.

The most famous relic of Roman mapping is the "Peutinger Table," which is a medieval copy of a Roman road map.

Roman techniques of land surveying were not improved upon until the 18th century.



4. **A.D. 500-600**—Roman garrison stations on the Nile. Schematic map from a compilation by military and civil officials. Courtesy of the Biblioteca Apostolica Vaticana.  
5. **Surveying treatise page**. Attributed to Hyginus Gromaticus. Sixteenth-century copy. Courtesy of the Biblioteca Apostolica Vaticana.  
6. **c. 1154**—Muhammed b. Muhammed Idrisi. World map. Originally in the form of a silver tablet, approximately 12' x 5'. From facsimile, courtesy of the Library of Congress, Geography and Map Division.

## Feudal Europe

After the fall of Rome, in the fifth century A.D., church theology dominated European cartography. The T-O map was a typical form with the Earth shown as a flat disc surrounded by ocean (the "O"). The "T" was formed by the Don River, the Nile, and the Mediterranean. T-O maps were oriented to the east, with Jerusalem at the center.



1. **c. A.D. 776-786**—Beatus of Valvacado world map. Early Christian T-O map. 18th-century manuscript copy. Courtesy of the Bibliothèque Nationale, Paris.  
2. **A.D. 900-1000**—"Cottonian" world map. Named after manuscripts in which it is contained. Courtesy and by permission of the British Library.  
3. **c. 1154**—Muhammed b. Muhammed Idrisi. World map. Originally in the form of a silver tablet, approximately 12' x 5'. From facsimile, courtesy of the Library of Congress, Geography and Map Division.

The Crusades and trade were forces of change. The Christian pilgrims developed guidebooks that contained strip maps. Sailors' nautical and coastal charts, called portolan charts, developed in Italy, Barcelona, and Majorca. These charts incorporated the use of the compass.



4. **c. 1250-1300**—"Carta Pisana." Considered the oldest surviving portolan chart. Courtesy of the Bibliothèque Nationale, Paris.  
5. **1375**—Abraham Cresques. Charts from the "Catalan Atlas" made for Charles V, King of France. From facsimile, courtesy of the Library of Congress, Geography and Map Division.

## The Explorers

Invention of the printing press moved mapping into a new age. The works of Ptolemy were among the first products of modern printing. Knowledge from explorations in the new lands and the attempts to find new routes to the East spurred the production of many maps, globes, and atlases.

"America" appeared for the first time on the world map published by Waldseemüller in 1507.



1. **1492**—Martin Behaim. Terrestrial globe. Facsimile globe, from the collections of the American Geographical Society, courtesy of the University of Wisconsin-Milwaukee.  
2. **1500**—Juan de la Cosa. Portolan chart. Courtesy of the Museo Naval, Madrid.  
3. **1507**—Martin Waldseemüller. "Universalis Cosmographia." World map. Facsimile edition, courtesy of the Library of Congress, Geography and Map Division.  
4. **1529**—Gerardus Mercator. "Nova et avctua orbis terrae descriptio ad vsvm nauigantium . . ." Employs the "Mercator projection." Courtesy of the Gemeente Rotterdam, Maritem Museum "Prins Hendrik"; and Harry N. Abrams, Inc.

The world map by Juan de la Cosa was the first to show Columbus's discoveries. Diogo Ribeiro mapped Ferdinand Magellan's discoveries.

Mercator translated the round Earth to a flat surface.

Ortelius and Waghenauer published the first atlases, by collecting the best maps of the day and engraving them on uniformly sized sheets.



5. **1589**—Abraham Ortelius. Map of Iceland. From *Theatrum Orbis Terrarum*. Courtesy and by permission of the British Library.  
6. **1584**—Lucas Waghenauer. Coastal chart from the *Spiegel der Zeevaert*, Waghenauer's first sea atlas. Courtesy and by permission of the British Library.  
7. **1659**—Gerardus Mercator. "Nova et avctua orbis terrae descriptio ad vsvm nauigantium . . ." Employs the "Mercator projection." Courtesy of the Gemeente Rotterdam, Maritem Museum "Prins Hendrik"; and Harry N. Abrams, Inc.

## The Measurers

New surveying tools, a knowledge of triangulation, the telescope invented by Galileo in 1609, and the pendulum clock invented by Christian Huygens in 1657, were the basis of 17th- and 18th-century efforts to accurately measure the Earth.

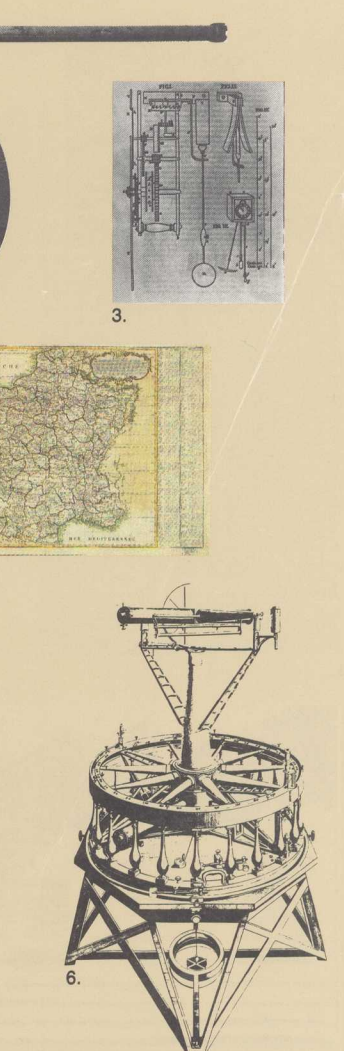
Isaac Newton's theory of universal gravitation challenged the premise that the Earth is a perfect sphere.



1. **1610**—Telescope used by Galileo in sighting the four satellites of Jupiter. Courtesy of the Istituto e Museo di Storia della Scienza, Florence.  
2. **Galileo Galilei (1564-1642)**. Engraving after a portrait by Giusto Susterman. Courtesy of the Library of Congress.  
3. **Pendulum clock**—Diagrams of the clock perfected by Christian Huygens in 1657. Courtesy of the Library of Congress.  
4. **1759**—John Harrison's marine chronometer #4. Approximately 5". Courtesy of the National Maritime Museum, London.

Determining longitude at sea was solved by the invention of the marine chronometer in 1765 by John Harrison.

The first topographic map of national scope was of France. It was made by the Cassini family and took 150 years to complete.



5. **1744**—Jacques Philippe Maraldi and César François Cassini de Thury. "Nouvelle Carte . . . de la France." Courtesy of the Library of Congress, Geography and Map Division.  
6. **Theodolite**—Built by Jesse Ramsden in 1787. From *Philosophical Transactions of the Royal Society*, 1790. Courtesy of the Peabody Library, The Johns Hopkins University.