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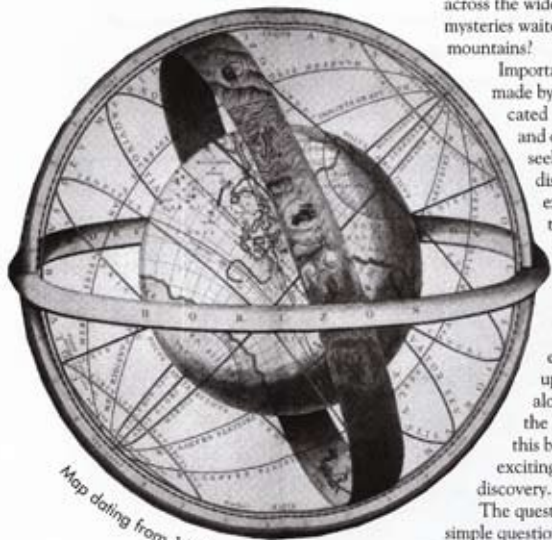
HOW BIG IS THE EARTH?

People throughout the ages have felt the urge to explore beyond the horizon. What wonders lay across the wide expanse of the ocean? What mysteries waited on the other side of the mountains?

Important discoveries have been made by professional explorers, dedicated scientists, talented amateurs, and ordinary people who became seekers after adventure. Their discoveries are interesting and exciting. Just as dramatic are the stories of how the discoveries came to be made.

Exploration takes many forms. It is not merely the quest for new lands, but the quest for knowledge about the earth. The earth does not give up its secrets easily. Exploration alone is not enough. Research in the laboratory plays a part, too. In this book we'll look at the most exciting examples of each kind of discovery.

The quest for adventure began with a simple question. What is the shape and size of the earth?



Map dating from 1660

Eratosthenes (er-uh-TAS-theh-nee-z) grew up in a town on the coast of Libya in northern Africa. He lived about 250 years before the birth of Christ, more than two thousand years ago. He studied at Alexandria in Egypt and at Athens in Greece. He traveled widely. He studied and wrote on mathematics, astronomy, and geography. He gained fame as Greece's most talented scholar.

Although born and raised in Africa, Eratosthenes was a Greek.

The cities of northern Africa became Greek following their conquest by the greatest general of ancient times, Alexander the Great. This famous general lived almost 350 years before the birth of Christ and well before the Roman Empire. Alexander the Great conquered Egypt, parts of Europe, and Asia as far east as India. He died of a fever in Babylon at age 32.

Upon the death of Alexander the Great, his conquest was divided among four Greek generals. Ptolemy III (TOL-uh-mee, the "P" is silent), a descendent of one of these generals, ruled northern Africa. This kingdom

included part of Egypt and the city of Alexandria.

In Alexandria, Ptolemy opened a library and museum. He ordered a search of all ships, caravans, and visitors who entered his realm. When Ptolemy's men found books,

maps, or interesting documents, they sent the documents to the library to be copied.

Ptolemy chose Eratosthenes to take charge of the library. Eratosthenes threw himself into the task. The library at Alexandria became a storehouse of the vast knowledge of the ancient world. Scientists came from all over Greece to study there.



Ancient Greeks discussing their different ideas about the earth.



Eratosthenes made many exciting discoveries. But his most astonishing achievement was calculating the distance around the earth. He did this at a time when many of the more backward and superstitious people still believed the earth to be flat.

The ancient Greeks understood that the earth was a sphere; that is, a ball. This was clear from several observations. The best argument for a spherical earth occurred during a lunar eclipse. The shadow of the earth as it fell on the moon was circular in outline.

Other observations pointed to a spherical earth, too. For example, as a ship sails out to sea, the hull of the ship disappears from view first. The masts disappear last. If the earth were flat, the ship would grow smaller as the distance from shore increased. It would be hidden from view by haze in the atmosphere, but it would not disappear below the horizon as it does on a curved earth.

In addition, travelers to the north reported that the North Star rode higher in the sky. On the other hand, travelers



to the south
said the North Star
circled closer to the horizon.

None of the Greeks ever traveled to the North Pole or to the equator. They believed the North Pole to be eternally frozen and far colder than a human being could endure. Nor did the Greeks ever travel as far south as the equator. They believed scorching sands of a worldwide desert circled the earth at the equator. Explorers foolish enough to travel there faced certain death.

But if an explorer could go to the North Pole or to the equator, the Greeks knew what he would see in the night sky. At the North Pole the North Star would be directly

Moon's Orbit

The ancient Greeks knew the earth was a sphere because of the shadow it cast on the moon during a lunar eclipse.

overhead. At the equator, the North Star would skim right along the horizon. South of the equator, the North Star would disappear entirely. This changing position of the North Star is best explained by the earth being spherical.

Eratosthenes agreed with the other Greeks that the earth was spherical.

Very well, Eratosthenes wondered, *how big is the earth?* If a person set out in one direction and traveled until he returned to his starting point, how far would he travel? No one knew. Without actually making the journey, how could a person find the distance around the earth?

The answer came to Eratosthenes as he read about a deep water well in Syene (now Aswan) in southern Egypt. On June 21, the

EXPLORING PLANET EARTH



The first in a series of three books on science, this book has broad appeal for any elementary-age child, but is written specifically as a resource tool for fifth grade through junior high level.

Blending a creationism perspective of history with definitions of terms and identification of famous explorers, scientists, etc., this book gives students an excellent initial knowledge of people and places, encouraging them to continue their studies in-depth.

Supplemented with photographs, illustrations, and chapter review activities, *Exploring Planet Earth* brings to life people like Marco Polo and Christopher Columbus, and gives students the opportunity to read history that hasn't been altered or erased altogether.



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