

ASTR 308 "Into the Final Frontier"

The Discoveres" Book IV

1. Briefly, describe the "The Awe of the Mountains". That is:

(a) What did mountains symbolize to people?

Mountains were the terra incognita as far back as several thousand BC. The tops of mountains were the dwelling places of the gods. They were sacred places and for some they were a place where humans might reach the gods.

(b) What were the famous mountains of the following people and provide a one sentence describe the significance of these mountains to these peoples?

- i. Hindus Mt Meru. The central mountain of the universe.
- ii. Japanese Mt. Fujiyama (Fuji). The mountain itself was a goddess over the land.
- iii. Jews Mt. Sinai. Where Moses communed with God.
- iv. Greeks (oops) Mt. Olympus. Zeus' domain and meeting place of the gods.

(c) In the flat lands of

- i. Mesopotamia 2200BC – ziggurats, or stepped pyramids
- ii. Egypt 3000 BC great pyramids
- iii. Mexico Pyramid of the Sun

Briefly describe the efforts of these peoples to emulate mountains (what were the names of the structures that each built?) and for what reasons did they build them?

Ziggurats (including Tower of Babel) were built such that the tops were sacred locations to commune with the gods. The Egyptians connected their kings to the "sky" or heavens by burying them in pyramids. In Mexico, the pyramids were temples of worship.

(d) What was the "Tower of Babel"? Where did it take place?

The Tower of Babel was a Mesopotamian ziggurat that is THE symbol of "man's effort to reach the heavens, to trespass on the territory of the gods." Occurred around 500 BC.

2. In "Charting Heaven and Hell",

(a) What was the role of the moon and the sun in many ancient cultures?

The moon is where the souls of the dead went. As it became full it was filling with souls. It deposited the souls on the sun each month, at which time it became "new". Then it continued its monthly cycle of filling with souls and transporting them to the sun.

(b) Briefly describe the journey of the after life according to the Greeks, including the judgment, and where the "bad" went and where the "good" went. Why did the Greeks place a coin in the mouths of the dead?

All Greeks were to cross the river Styx, for which a quarter was put in their mouths to pay the passage across the river to the boat master, Charon. Then the souls were judged. The wicked went left to Tartarus and the virtuous went right to the Elysian Fields.

(c) Who was Dante Alighieri? What was the name of his significant work. Briefly describe his geography of the afterworld.

Dante was the "most persuasive" Christian geographer. He wrote the *Divine Comedy*. There were nine chasms of the underworld, each deeper level a region of harsher punishment for the damned. The lowest was where Satan resided. There are seven levels for the seven deadly sins to ascend to the nine levels of heaven. In a final tenth level, God resided.

3. In "The Appeal of Symmetry"

(a) What was the Homeric notion of the geography of the Earth? By whom was it ridiculed?

Homer believed the earth was a circular disk surrounded by the river Oceanus. It was ridiculed by Herodotus.

(b) What were the contributions of Pythagoras and Plato to "Western Thought"? What did they believe the shape of the Earth to be and why?

They developed the belief system (still in use today in the sciences!) that the earth and heavens should conform to perfect forms, and the most perfect of these was the sphere.

(c) What significant experiment did Eratosthenes perform? When? Briefly describe his experiment and how accurate he was.

Assuming a spherical earth, Eratosthenes measured its circumference (the distance around the sphere). He did this in about 200 BC, on June 21 (summer solstice). He used the angle of the shadow of an obelisk in Alexandria, Egypt, which was due north of Syene, Egypt. On June 21, no shadow is seen in a certain well in Syene, so Eratosthenes knew that the sun was directly overhead in Syene on that day. He used the angle of the obelisk shadow in Alexandria to compute the distance from Alexandria to Syene. Using ratios, he determined the earth's circumference to within 15% of the known value.

(d) Who is Strabo? When did he live? What marginal contribution (yet an important stepping stone) did he contribute to the science of cartography?

Strabo was a Greek who lived about 50 BC. He broke the "latitude" of the earth (not yet understood) into loose regions called climata. The climata were based, roughly on the climates of the different latitudes on earth. This was a logical step in the Platonic notion of symmetry.

(e) Who was Hipparchus of Nicaea? When did he live? What was his major contribution to the science of cartography and why was it so significant?

Hipparchus was a Greek who lived about 150 BC. He is recognized as the greatest of the Greek astronomers and invented trigonometry (important for cartography on a sphere). He invented the concepts of latitude and longitude, an idea that he developed from the method of locating stars in the sky. Thus, he proposed that idea that one's location on earth could be connected to the observations of the stars. He conceived a world mapping method and set the stage for "man's dominance over nature" by "discovering and marking the dimensions of experience".

(f) Who was Ptolemy? When did he live? For what reasons is Ptolemy considered the "indisputable father of modern geography"? Provide a few examples of his contributions. How did these contributions "prepare Europe for World exploring"?

Ptolemy was a Greek-Egyptian who lived about 100 AD. He extended and refined the work of Strabo and Hipparchus and built the vocabulary of modern cartography. He charted the latitude and longitude of 8000 places and established the orientation of maps with north to the top and east to the right. He made the distinction between chorography (mapping local places) and geography (mapping the whole earth, which required Hipparchus' trigonometry!). Ptolemy's work established the spherical nature of the earth and organized it such that his work was the keystone upon which world exploration could be organized. He provided the paradigm by which future minds were "called" to explore.

(g) What errors did Ptolemy make that may have been historically pivotal in inducing Columbus to sail west and then discover the New World?

Three/Four errors were made. (1) He declared the earth was 18,000 miles in circumference (when it is more like 28,000 miles). (2) He underestimated that one degree of latitude or longitude was 50 miles instead of the actual 70 miles. (3) He showed Asia stretching 180 degrees around the globe instead of the actual 130 degrees. (4) He also showed that Africa connected with an unknown southern continent, so that there was no eastward sea passage to the east. No wonder Columbus wanted to sail west!

4. In "The Prison of Christian Dogma"

- (a) What happened to the science of geography and for how long did this occur (give the approximate years)? Why does Boorstin call this "The Great Interruption"?

For approximately 1000 years (300-1300 AD), geography vanished from the sciences (there was no word for it until the 1600s!). This is a "Great Interruption" because all the works of the Greeks and Ptolemy in 100 AD were completely ignored and forgotten. Thus, exploration of the earth and the growth of human experience were halted for about 1000 years.

- (b) What city became the center of all maps of the Earth? **Jerusalem.**
- (c) What location was not known (but guessed at) and became the most important location to find on Earth? What analogy does Boorstin draw between modern "heroes" and those individuals who traveled a far to locate this place?

The most sought location on earth was the "Eden" of the Book of Genesis from the Moses' writings (the Bible as we know it did not yet exist!). Those who explored in search of Eden were famous heroes, which Boorstin likens to the astronaut heroes of the space age.

- (d) Who is St. Brendan? When did he live? For what reasons was he so incredibly famous? How many years transpired before he was found out to be incorrect?

St. Brendan was an Irish monk (astronaut hero!) who lived about 500 AD. He believed that Eden was in the Atlantic Ocean and his island became a famous destination to be found (but never was). His story of his paradise and "experiences" were so famous that they were translated into some nine languages! Not until 1759 did map makers discard his island from their maps (due to the explorations of the Portuguese).

5. In "A Flat Earth Returns"

- (a) What were anti-pods? Why was it heretical to believe in them?

Anti-pods were people who lived below the earth's equator (assuming it was spherical). It was believed that they lived on the other side of a wall of fire. Thus, they could never be exposed to the savior, Jesus Christ. It was heretical (i.e., contradictory to Christian faith) to believe that God would knowingly isolate humans from his Word and Plan for Salvation. Thus, the anti-pods could not exist.

(b) Who "provided the standard source of geographic myth during all the years of the Great Interruption"? **Julius Solinus**

(c) Briefly compare the Christian geographers to those of the Chinese during the Great Interruption. What shape did the Chinese believe the Earth was?

Christian "geography" was "a hodgepodge of fantasy and dogma". By 100 AD and onward, the Chinese independently devised a grid work on a flat earth model and never abandoned the grid work idea

(d) Who was Cheng Heng? When did he live? What contribution did he make the science of cartography?

Cheng Heng was a Chinese geographer and astronomer who lived about 100 AD. He developed a systematic set of coordinates for earth and the heavens. He set the stage for the Chinese cartographers.

(e) Who was Phei Hsui? When did he live? What contribution did he make the science of cartography?

Phei Hsui was a Chinese geographer who lived about 250 AD. He is recognized as the Chinese Ptolemy. In addition to making excellent maps free of errors, he developed how to make properly scaled maps.

(f) What role did silk likely play in the development of Chinese cartography?

The geographic terms "ching" and "wei" were possibly derived from the warp and weft of the silk.

(g) What role might the Arabs and Chinese have played in ending the Great Interruption in Europe?

Before the Mongols opened the east west pathways, only Arabs could communicate knowledge from east to west or visa versa. The Arabs may have been instrumental in bringing some of the Chinese ideas about geography to the west, thus slowly infiltrating new ideas amongst the Europeans.