

Chinese Explorations and Discoveries

By the year 1125, the Chinese were responsible for inventing what important navigational tool?
What two technological innovations did Chinese ships have by the mid 1400s?

Although science and exploration lay idle in Europe during the Middle Ages, that wasn't the case in China. Among many important contributions in that era, the Chinese were responsible for inventing the magnetic compass.

Historians think that the Chinese were aware of magnetism as early as 240 B.C. However, the first definitive reference in Chinese literature to a true compass dates to approximately 1000 A.D. Chinese literature suggests that the compass was in use for sea-faring around 1125. Compare this to European culture, where the first reference to a compass appears in a poem from 1190. It wasn't until the 1400s that European sailors fully understood compass navigation.

Artifacts and other archaeological evidence suggest that Chinese seafaring was well established by about 1000 A.D. Maps from the period show extensive trade routes along the eastern Chinese coast. Some routes extended as far as Korea, Japan, and Australia.

By the mid 1400s, shipbuilding was well established in China. More than 300 ships sailed under Chinese Admiral Zheng, known for traveling to 37 countries and around the tip of Africa. Chinese ships from that period had two technological innovations that are part of modern ships today: central rudders and watertight compartments.

Figure 2-19
Chinese ship circa 1450 A.D.
Although science and exploration lay idle in Europe during the Middle Ages, that wasn't the case in China. Among many important contributions in that era, the Chinese were responsible for inventing the magnetic compass. By the mid 1400s, shipbuilding was well established in China. More than 300 ships sailed under Chinese Admiral Zheng.



Philip Nicholson

Life on an Ocean Planet

European Voyages of Discovery (1400-1700)

The End of the Middle Ages and a Route Around Africa

What were the primary motivations that led to the ocean explorations of the 15th century?

What three explorers established the route around the Cape of Good Hope to India?

In Europe, the 1400s mark an important transition at the end of the Middle Ages. This period is called the Renaissance (from the Latin *renasci*, meaning *to be born again*). It centered in Italy and spread throughout Europe through commerce and those who had studied in Italy and traveled. It was a period marked by a "rediscovery" of principles and science put forth by the Greeks, Romans, and other cultures.

With the Renaissance came new interest in long ocean expeditions. The primary motives for these were economics, politics, and religion. In the early 1400s, Prince Henry the Navigator of Portugal

STUDY QUESTIONS

Find the answers as you read.

1. What were the primary motivations that led to the ocean explorations of the 15th century?
2. What three explorers established the route around the Cape of Good Hope to India?
3. What was the purpose of Christopher Columbus' four expeditions?
4. Who is credited as being the first European to recognize that South America was a new continent?
5. What was Vasco Núñez de Balboa's accomplishment?
6. Who led the first expedition around the world? Over what years did the voyage take place?
7. Who led the second expedition around the world? Over what years did the voyage take place?

set his sights on finding a route to the East around Africa. Using a new device among European sailors at the time—his compass—a new device among European sailors at the time—his compass—a new device among European sailors at the time—his compass—brought back new information about the west African coast. Although he learned a great deal, he didn't find a route to the East.

Twenty years after Henry's death, Bartholomew Dias completed the first voyage around the Cape of Good Hope in 1487. Ten years after Dias, Vasco da Gama (1469-1524) finally led the first expedition around the Cape of Good Hope to India.



Figure 2-20
Vasco da Gama's journey to India.
A fleet of ships under da Gama's command left Lisbon harbor in July, 1497. After having passed the Cape of Good Hope and sailed up the east coast of Africa, da Gama first sighted the coast of India in May of 1498.

Exploration of the New World

What was the purpose of Christopher Columbus' four expeditions?
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What was Vasco Núñez de Balboa's accomplishment?
Who led the first expedition around the world? Over what years did the voyage take place?
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In 1492, Portuguese Christopher Columbus (1451-1506) set out on the first of his four famous voyages. His purpose was the same as Prince Henry's and Vasco da Gama's: to find a route to Asia and

the East Indies. Because he was using Ptolemy's estimation of the Earth's size (which was too small), he believed he'd reached Asia when he landed on a Caribbean island. Like all Europeans, the existence of the Americas was unknown to him.

Several expeditions followed Columbus. Sailing on behalf of Portugal and Spain, Italian Amerigo Vesputci (1454-1512) voyaged to South America several times. He explored much of its east coast and the mouth of the Amazon River. Vesputci is credited as the first European to recognize that South America was a new continent. A world map produced in 1507 honored Vesputci's discoveries by labeling the New World "America."

In the early 1500s, Vasco Núñez de Balboa led an expedition that crossed the Isthmus of Panama in Central America and discovered the Pacific Ocean on the other side. By doing this, Balboa became the first European to sail in the Pacific.

News that the Pacific Ocean lay beyond the Americas restored the hope that you could reach the east by sailing west. That is, that you could sail around the world. The first expedition to do this set sail in 1519 under the command of Portuguese Ferdinand Magellan. He, like Columbus, wanted to establish a trade route to the east. But, unlike Columbus, he had a better idea of how far he had to travel.

Magellan's trip was financed by Spain and began with five ships and about 260 men. Of these, a single ship and 18 men made it back in 1522. The rest died en route from disease and accidents.



Figure 2-21
Magellan's and Drake's around-the-world voyages of discovery.
News that the Pacific Ocean lay beyond the Americas restored the hope that you could reach the east by sailing west. That is, that you could sail around the world. The first expedition to do this set sail in 1519 under the command of Portuguese Ferdinand Magellan. He, like Columbus, wanted to establish a trade route to the east. But, unlike Columbus, he had a better idea of how far he had to travel. Many men, including Magellan, died on the trip and the crew returned to Spain in 1522. In 1577 Sir Francis Drake, a private turned explorer, began the second circumnavigation of the globe.

Magellan himself perished in the Philippines in a fight with islanders. Needless to say, the number of deaths and the stories of hardships discouraged anyone from trying to sail around the world again.

In 1577, Francis Drake left England on an expedition to the New World. His purpose was to raid Spanish ships and settlements for their treasure. His expedition rounded the southern tip of South America, then successfully raided Spanish territory along the west coast of South America. Loaded with treasure and knowing the Spanish would be waiting for him in the Atlantic, Drake decided to make for home by going westward. When he returned to London in 1580, Queen Elizabeth knighted him for his exploits. His cargo of treasure and spices was worth a fortune. This was the second successful circumnavigation of the world.

The Birth of Marine Science (1700-1900)

The beginning of the 18th century marked a distinct change in sea exploration. While previous exploration had been motivated by specific military, trade, or conquest objectives, at this time exploration for its own sake began to take place.

Several factors contributed to the change. By 1700, global colonialization had distributed European outposts widely. This made repairs and resupply more available and allowed seafarers to range farther without fear of being too far from food or the ability to make major repairs. Another important factor was the rise of Britain as a sea power.

As Britain began to compete with France and Spain for global conquest, they realized that the more they knew about the seas and the world, the more effective they would be. The Royal Navy launched voyages with the objectives of exploration, mapping, and projecting British presence around the world. The crew often included scientists and naturalists.

Cook's Expeditions

In what way did the voyages of James Cook differ from those of sea explorers before him?

What invention in 1735 was a major breakthrough for open-ocean navigation?

What geographical discoveries did the Cook expeditions make?

The voyages of Captain James Cook largely receive credit as the first sea expeditions devoted to methodical, scientific oceanography. They differed from those of sea explorers that came before in that they were the first major expeditions launched with science and exploration as their only goals. They also documented their findings with more detail and attention to the scientific method than any previous major expeditions.

A major contribution to Cook's voyages was the invention of the *chronometer*. The chronometer was a clock or watch that wasn't affected by the waves and motion of the sea. Introduced in 1735, the chronometer was a major breakthrough for open-ocean navigation because it made it possible to determine longitude in the open sea. This meant that sailors could determine their exact position out of sight of land—even in uncharted

STUDY QUESTIONS

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1. In what way did the voyages of James Cook differ from those of sea explorers before him?
2. What invention in 1735 was a major breakthrough for open-ocean navigation?
3. What geographical discoveries did the Cook expeditions make?
4. Which continent did the United States Exploring Expedition prove exists?
5. Why do we remember Matthew Maury as the father of physical oceanography?
6. How did Darwin explain the formation of coral reefs?
7. What theory did Darwin propose as a result of his observations during the H.M.S. *Beagle* expedition?
8. What expedition is commonly recognized as the first devoted entirely to marine science?
9. What accomplishments and discoveries did the H.M.S. *Challenger* make?