



Henry the Navigator and 15th Century European Exploration

The Great Silk Road connected the empires of Asia and the Mediterranean countries during the first centuries of the first millennium, serving as the primary overland trade route between the two regions. Caravans of mules and camels driven by itinerant merchants carried silks and spices from China to trading posts along the way. For Europeans, these coveted goods created the desire that inspired the great intercontinental ocean voyages of the 15th and 16th centuries.

By the early 1400s, new navigation tools and mapping advances made Europe's exploration and colonization of most of the rest of the world possible. During this period, coastal navigation from city to city in the Mediterranean offered few major obstacles. The Mediterranean was a long, narrow, enclosed sea in which familiar landmarks would appear on the horizon sooner or later. Cities such as Venice, Amalfi, and Genoa were becoming hubs of maritime commercial traffic.

The magnetic compass, quadrant, astrolabe and the requisite solar tables of declination that accompanied the latter were beginning to be widely used.

Portolan charts, the oldest sea charts in existence, dated back to the late 1200s. They showed the Mediterranean with astonishing cartographic precision. The rediscovery of Ptolemy's geography

in 1409, when it was translated from Greek to Latin, convinced learned men that a coordinate system based on latitude and longitude was the best way to describe terrestrial positions.

Geography Is Destiny

Alone among the Mediterranean cultures, Portugal faced the Atlantic yet had no direct access to the Mediterranean itself. Thus, by necessity, if the nation wanted to expand its horizons, it must turn towards the open waters of the Atlantic. So, the Portuguese sailed the great ocean, hundreds of miles from land and made most of Europe's high-sea expeditions in the early 1400s. They learned about wind patterns and ocean currents and developed sophisticated sailing and ship construction techniques that left the other European maritime powers lagging behind.



Various trade routes that made up the Great Silk Road (in red). Photo courtesy of Wikimedia Commons.



Top detail of Padrao dos Descobrimentos, a massive monument commemorating Portugal's voyages of discovery. It was unveiled in 1960 in Lisbon harbor on the 500th anniversary of the death of Henry the Navigator. Photo courtesy of Wikimedia Commons.

systematically took their vessels further towards the south.

In the early voyages, Cape Nun (Nigeria) was the most southerly headland to which the seamen were prepared to sail. They would go no further fearing the legend that nobody could return if they ventured beyond Cape Nun. (Legend had it that at the tropics a vertical sun was believed to boil the sea and to scorch the inhabitants, a “fact” that Europeans assumed by observing the skin color of the indigenous population.)

Cape Nun was finally rounded in about 1434 when Gil Eanes reached Cape Bojadar at a latitude of 29 degrees. In 1441 an expedition reached Rio de Ouro which lay on the Tropic of Cancer. Then came Cape Blanco, named for its dazzling white beaches at a latitude of 21 degrees. The next significant cape was Cape Verde at less than 15 degrees from the equator; navigator Dinis Dias correctly noted it as the most westerly cape in Africa.

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Prince Henry — posthumously called “The Navigator” by the British — oversaw most of the Portuguese discoveries during this period. Henry was one of several high-achieving children of King John I of Portugal and Phillipa of Lancaster, his English queen. (The appropriateness and worthiness of the “Navigator” label ascribed to Henry are largely disputed by historians. Prince Henry’s accomplishment and legacies are discussed in the second part of this article.)

Henry financed and established the first European colonies on the islands off the coast of West Africa and the Lisbon slave market — the beginning of the devastating Atlantic slave trade.

In 1418, Portuguese navigator João Goncalves Zarco was driven off course by a storm and the accident led him to rediscover the uninhabited Atlantic island of Madeira west of Morocco, first located by Europeans the previous century but never occupied. Henry immediately started a colony so that he could claim Madeira for Portugal.

In the next decade, the Azores were discovered by Diego de Sevilha and the first Portuguese settlement established in 1432. This discovery involved a journey of 800 miles into the Atlantic with no coastline to guide them.

Next came the Canary Islands. These were inhabited by the aboriginal “Guanches” who had had dealings with the Romans. The Portuguese used the islands as a strategic offshore base for commerce with coastal African states and traders.

A Continuing Journey

In 1433, Henry’s brother Duarte became king. Duarte supported Henry’s plans and the latter was able to persuade his captains to venture further to the south along the coast of Africa, which was virtually unknown to the Europeans. Every year ships returned with new discoveries as Henry’s captains



Replica of the ship that made the European age of discovery possible – the Portuguese Caravel (Musee del la Marine, Paris) Photo courtesy of Wikimedia Commons.

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In the 1450s, Henry's captains encountered the Cape Verde Islands and this gave the Portuguese a sequence of provisioning stations from where they could reach the gold, silver, spices and slaves of the west coast of Africa. The islands were better suited than the mainland for this purpose, partly because of the climate and partly because of the ease with which they could be defended.

In 1456 Alvise de Cadamosto and Nuno Tristão reached the River Gambia and their journals describe the explorers eating the flesh of an elephant. The Portuguese erected stone columns, called *padrões*, at key capes and headlands to show Henry's claim to the west coast of Africa.

Henry had sown the seeds of great voyages in the future. It was not until a generation after his death in 1460 that the most important Portuguese navigation achievement was made: the existence of a sea passage around Africa to India and East Asia. ♦



Contemporary painting of Infante D. Henrique. Photo courtesy of Wikimedia Commons.

Portions of this article were excerpted from Peter Aughton, Voyages that Changed the World, Quercus Publishing, London, England, 2007.

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No Requirement for Loran-C

According to the notice signed by Rear Admiral Kevin S. Cook, the USCG's director of prevention policy, Loran-C is no longer required by the armed forces, the transportation sector, or the nation's security interests, and is used only by a small segment of the population. According to the *Federal Register* statement, the Loran-C system was not established as, nor was it intended to be, a viable systemic backup for GPS.

Backups to GPS for safety-of-life navigation applications, or other critical applications can be other radionavigation systems, or operational procedures, or a combination of these systems and procedures, according to the administration's assessment. Backups to GPS for timing applications can be a highly accurate crystal oscillator or atomic clock and a communications link to a timing source that is traceable to Coordinated Universal Time.

With respect to transportation — including aviation, commercial maritime, rail, and highway modes — the Department of Transportation has determined that sufficient alternative navigation aids currently exist in the event of a loss of GPS-based services, and therefore Loran currently is not needed as a back-up navigation aid for transportation safety-of-life users, the agencies have concluded.

According to the announcement, DHS "will continue to work with other Federal agencies to look across the critical infrastructure and key resource sectors identified in the National Infrastructure Protection Plan assessment to determine if a single, domestic system is needed as a GPS backup for critical infrastructure applications requiring precise time and frequency".

"If a single, domestic national system to back up GPS is identified as being necessary, the Department of Homeland Security will complete an analysis of potential backups to GPS. The continued active operation of Loran-C is not necessary to advance this evaluation." ♦

A promotional poster for the ION GNSS 2010 conference. The background features a satellite in orbit over a cityscape. The text is as follows:

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