

"Columbus: What If?"

by Aileen Vincent-Barwood

in "Aramco World" (January/February 1992, Vol. 43, No. 1, pp. 5-9)

Arabic had been the scientific language of most of humankind from the eighth to the 12th century. It is probably for this reason that Columbus, in his own words, considered Arabic to be "the mother of all languages," and why, on his first voyage to the New World, he took with him Luis de Torres, an Arabic-speaking Spaniard, as his interpreter.

Columbus fully expected to land in India, where he knew that the Arabs had preceded him. He also knew that, for the past five centuries, Arabs had explored, and written of, the far reaches of the known world. They had been around the perimeter of Africa and sailed as far as India. They had ventured overland beyond Constantinople, past Asia Minor, across Egypt and Syria--then the western marches of the unknown Orient--and into the heart of the Asian continent. They had mapped the terrain, traced the course of rivers, timed the monsoons, scaled mountains, charted shoals and reached China, and, as a result, had spread Islam and the Arabic language in all these regions (See "Aramco World", November- December 1991).

It was on the 33rd day of his voyage, October 12, 1492, that Columbus made his landfall. At that point, he probably stood on the shores of a Bahamian island named Guanahani--which he immediately renamed San Salvador and claimed for "their sovereign majesties, the king and queen of Spain."

Probably the first of his surprises that day was his discovery that the "Indians," as he called the islanders he greeted, did not speak Arabic.

Still, he remained undaunted and wrote in his log for Friday, October 12, that he was certain he had only to sail on through these outer islands of India to reach the riches of Cipangu (Japan) and China, a journey of only a further 1000 miles. Here, he was convinced, he would greet the Great Khan, an emperor of vast wealth who spoke Arabic and ruled over lands of gold, silver and gems, silks, spices and valuable medicines.

One may wonder how Columbus, a 41-year-old professional mapmaker, avid reader, researcher and seasoned mariner, a man who had spent the greater part of his adult life planning his great venture to the west, could have been so far off in his calculations.

One explanation may be that, as well as a master mariner, he was also a clever politician. As a Christian whose expedition was funded by two Christian monarchs, King Ferdinand II of Aragon and Queen Isabella I of Castile, Columbus's miscalculations may well have been due not to a lack of navigational information--of which there was a great deal available--but to a calculated decision to use "acceptable" sources of scientific knowledge and to exclude or ignore other, more "foreign" sources.

During the seven centuries of Arab dominion over Spain and Portugal, from AD 711 to 1492, there had developed a culture of Muslim arts and sciences which had a deep and permanent effect on the life, arts and sciences of Europe. The roots of this culture went as far back as Europe's Dark Ages, which can be defined as lasting roughly from AD 476 to 1000, during which the Arab world was the incubator of Western civilization. The Arabs not only preserved, refined, updated and translated into Arabic the rich heritage of classical Greek knowledge, but they also added original and significant new contributions (See "Aramco World", May-June 1982).

Once Europe began its explorations of the world of knowledge, it turned not to Greek or Roman sources, most of which were lost or inaccessible, but to Arabic scientific writings. Recognizing this, Europeans in the 12th century embarked on a massive program of translation of these sources, founding a college of translators in Toledo, Spain, from which most of the Arab works on mathematics and astronomy were first made available to Europe's scholars.

During that period and even earlier--in fact, dating back to the days of the Roman Empire (27 BC to AD 284)--people had discussed the idea of sailing west to find the riches of the Golden East. Yet no one had ever tried it.

By the seventh century, however, the Arabs were thoroughly familiar with the eastward approaches to the Orient. For over 300 years they had explored much of the known world. From Delhi and Agra in the east, through Tehran, Baghdad and Damascus, to Cairo, Tripoli, Tunis and Cordoba in the west, Arab scientists and explorers had expanded the knowledge of the known world and pushed back the horizons of the unknown.

Ultimately, this knowledge--along with philosophy, logic, mathematics, natural history and much else--was to be found written down in the great libraries that were the flowers of Spain's brilliant Muslim-Christian-Jewish culture, and in libraries elsewhere in Europe. Arab geographical encyclopedias, dictionaries, maps and charts, as well as books on mathematics, astronomy and navigation, and treatises on vastly improved navigational instruments, reposed there in Muslim Spain and in the Middle East.

So, too, did the theory of "the new world beyond the Sea of Darkness," the idea of an uncharted continent that lay to the west of the known world. There seems to be little doubt that it was the Arabs who first made the maps that led Columbus to the New World.

Growing up in a major seaport, Columbus could not have escaped hearing about Arab exploits and Arab seafaring skills at an early age. The son of Domenico Colombo, a prosperous weaver, Cristoforo Colombo was born in 1451 and grew up in Genoa. A great cosmopolitan merchant center in the mid-1400's, Genoa had colonies in Egypt, Syria, Cyprus, Constantinople, and on the shores of the Black Sea and the Sea of Azov.

From these far-flung colonies, Genoese merchants, colonists, diplomats and missionaries ventured forth into Anatolia, Georgia, the Caspian Sea, Persia and India. In the mid-15th century, the Levantine coast was an open door to the East, ideally situated for trading with

the ports of the Black Sea and Asia Minor. Indeed, 200 years earlier, when recording his wondrous tales of his journeys to the Far East, the Venetian traveler Marco Polo wrote of meeting Genoese and Venetian merchants on the Great China Road. From some of Columbus's letters, we know that he was profoundly affected by Marco Polo's account of his travels.

The prosperous Colombo family lived in a house near the Porta Sant' Andrea, and by his own account, we know that by the time he was 10 years old, the young Columbus loved the bustle of the port. He would linger on the docks and watch the seamen going back and forth from the giant sailing ships crowding the harbor, ships that had arrived across shining seas from far-off and exotic places like Chios and Constantinople, Egypt and Tunis and Syria. He and his friends like to play games among the bales and crates of silk and cotton, the kegs of oil and wine and spices.

Entranced, he would sit down with the sailors, a small blue-eyed, red-haired lad, and listen raptly to their tales of the magical lands to the east. It is hard to imagine that the boy Columbus would not have been stirred by the daring exploits of these sailors, many of them from the Levant--or by the tales he heard later when, as a seagoing lad of 14, sailing out of Genoa, he listened to the shipboard tales of the venturesome Arab traders who roamed the eastern Mediterranean.

He was unlettered and unread in those days. Not until years later did he teach himself to read, and then it was not in his native Italian, but in Castilian Spanish.

By the time Columbus arrived in Portugal, he was somewhere in his mid-20's. The Christians had reconquered much of Spain and Portugal from the Muslims. Nonetheless, because of the Muslim heritage, the Iberian Peninsula was still Europe's center of intellectual and artistic endeavor. Lisbon, where Columbus lived while planning his voyage into the Atlantic, was the capital of Portugal and a learned city in which it would have been easy for him to get the books and materials he needed to pursue his research. Since his youth, he had learned Spanish, Portuguese, Latin and other languages. It therefore seems likely that Columbus--sailor, navigator, professional cartographer and later son-in-law of one of Henry the Navigator's sea captains--would have drawn on this wealth of Muslim geographical knowledge.

Indeed, Columbus wrote in a letter in 1501 that during his many voyages to all parts of the world, he had met learned men of various races and sects and had "endeavored to see all books of cosmography, history, and philosophy and of other sciences." It is therefore unlikely he would have overlooked the more than four centuries of Muslim science and exploration available to him so close at hand.

According to one of his biographers, the American Samuel Eliot Morison, author of "Admiral of the Ocean Sea", Columbus did some "heavy combing through ancient and medieval authorities on geography" before setting out on his voyage "in order to gather

information and ammunition for his next bout with the experts." If this is so, he could hardly have missed such translated works as al-Biruni's "History of India" and Yaqut's "Mu'jam al-Buldan". It would seem also that he would have delved eagerly into Ibn Battuta's 13th-century "Rihlah" (Journey), in which that greatest of early travelers writes about his 120,000-kilometer (75,000-mile) trip from North Africa to China and back.

From several of his other biographers, most notably the Spanish priest Fray Bartolome de las Casas, it is also known that Columbus was an avid reader of books on geography and cosmography. Four of the books he owned have been preserved: a 1485 Latin translation of the "Book of Ser Marco Polo", an Italian translation of Pliny's "Natural History" printed in 1489, Pierre d'Ailly's "Imago Mundi" and minor treatises, and a 1477 edition of the "Historia Rerum Ubique Gestarum" by Pope Pius II.

Columbus also admitted relying heavily on information he gleaned from the school of navigation founded by Prince Henry of Portugal, often known as Henry the Navigator. Around 30 years before Columbus's first voyage, some of the prince's caravels had sailed west, to the outer edge of the Azores and perhaps as far as present-day Newfoundland. Concluding that there were other lands to explore beyond what Ptolemy had described in his second-century "Guide to Geography", and eager to retain and organize the geographical information in the possession of sailors and navigators--many of them from the Levant--the prince established the school at Sagres, in southern Portugal, to act as a sort of clearing house for present and future knowledge of the sea. It may have been from this source that Columbus discovered that when, years earlier, Vasco da Gama had sailed along Africa's east coast, he was guided by an Arab pilot, Ahmad ibn Majid, who used an Arab map then unknown to European sailors.

And yet, despite all this available information, Columbus made a major miscalculation of the distance he had to sail to reach the other side of the globe.

That the earth was a sphere was not a new idea, and it was widely accepted by well-educated people in Columbus's time. So was the Greeks' division of the spherical earth into 360 degrees, but where sources differed was on the question of the length of a degree. The correct measurement, we know today, is about 111 kilometers (60 nautical miles) per degree at the equator. In the third century BC, the Libyan-born Greek astronomer Eratosthenes, director of the library at Alexandria, had come up with a remarkably accurate calculation of 100 kilometers (59.5 nautical miles) per degree; in the second century, the great Alexandrian geographer Ptolemy had calculated the degree at 93 kilometers (50 nautical miles). In the ninth century, Muslim astronomer Abu al'Abbas Ahmad al-Farghani, whose works were translated into Latin during the Middle Ages and who--under the name Alfraganus--was studied widely in Europe, had calculated that a degree measured 122 kilometers (about 66 nautical miles)--not as accurate a result as that of Eratosthenes, but better than Ptolemy's.

Either Columbus erroneously used Roman miles in converting al-Farghani's calculations into modern units of distance--thus coming up with a figure of 45 miles per degree at the equator--or, after first deciding that al-Farghani's figure was right, chose in the

end, perhaps for reasons of policy, to follow the revered and irrefutable Ptolemy, whose "Geography", in its first printed Latin edition, had gained great popularity in 15th-century Europe. In the first case, Columbus would have underestimated the distance he had to sail to reach Asia by a third; in the second, by some 25 percent.

Had Columbus but accepted the ninth-century findings of a consortium of 70 Muslim scholars, working under the aegis of Caliph 'Abd Allah al-Ma'mun, who had gathered them to determine the length of a degree of latitude, he might have avoided many mistakes.

Using wooden rods as measures, the caliph's scholars traveled a north-south road until they saw a change of one degree in the elevation of the pole star. Their measurements resulted in an amazingly accurate figure for the earth's circumference: 41,526 kilometers, or 22,422 nautical miles--the equivalent of 115.35 kilometers per degree. By Columbus's time, a wealth of knowledge gleaned from Arab science and exploration rested in the libraries of Spain and Portugal. Al-Biruni had accurately determined latitude and longitude and--six hundred years before Galileo--had suggested that the earth rotated on its own axis. One hundred years later, in the ninth century, the mathematician al-Khwarizmi had measured the length of a terrestrial degree and Arab navigators were using magnetic needles to plot accurate courses. It was around this time, too, that the Arab astronomers Ibn Yunus and al-Battani--or Albategnius, as he was known in Europe--improved the ancient astrolabe, the quadrant, the sextant and the compass to the point that, for hundreds of years afterward, no long-distance traveler could venture forth without them. By the 12th century, the Hispano-Arab geographer al-Idrisi had completed his voluminous world atlas containing dozens of maps and charts (See "Aramco World", July-August 1977).

In calculating the distances he had to travel to reach India and the Orient, Columbus chose not to rely on the Arab and Muslim sources. He was, instead, greatly persuaded by the theory of Paolo Toscanelli, a Florentine physician who dabbled in astronomy and mathematics. When he saw Toscanelli's charts stating that Marco Polo's estimate of the length of Asia was correct, and that it was only 3000 miles from Lisbon westward to Japan and 5000 to Hangzhou, China, Columbus accepted the figures he wished most to hear. It was Toscanelli's chart he took with him on his first voyage of discovery.

Columbus also believed that his voyage west from Spain to India, though difficult, would be short. Using maps and information based on the calculations of Ptolemy and Martin Behaim, the German cartographer, he believed he could reach China after no more than a 4000-mile voyage. This notion was confirmed by Pierre d'Ailly's "Imago Mundi", a book that, according to Columbus's son and biographer Ferdinand, was his father's bedside companion for years. (Columbus's copy, its margins covered with hundreds of handwritten notes, is in the Seville museum.) D'Ailly believed that the western ocean, between Morocco and the eastern coast of Asia, was "of no great width." He followed the system of Marinus of Tyre, a second-century Greek who made Eurasia very wide east to west, and the Atlantic Ocean narrow, and predicted that the latter could be crossed in a few days with a fair wind.

According to Columbus's log--the original of which has been lost, or, as some historians suggest, destroyed--he sailed his tiny fleet of three small ships to the New World by dead reckoning. This means he crossed the vast expanse of Atlantic Ocean between the Canary Islands and the Bahamas using only a mariner's compass and dividers, a quadrant and lead line, an ampolleta, or half-hour glass, a ruler, and charts. His charts were sheepskins that showed the coasts of Spain, Portugal and North Africa, the Azores, Madeira and the Canaries. He took his course from his mariner's compass, developed from the magnetic needle used four centuries before by Arab navigators. His quadrant was an early invention of the great Arab astronomer Ibn Yunus of Cairo.

There is no doubt that Columbus deserves to be celebrated, in this anniversary year, for his courage, perseverance, sailing skills and superb navigational ability. On the other hand, one can only wonder what might have happened that October day 1492 had he heeded eight centuries of Arab invention and navigational knowledge. Certainly it would have made his navigation easier, his fears fewer, and his landfall more accurate.

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Original Source:

<http://www.millersville.edu/~columbus/data/geo/VINBAR01.GEO>

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