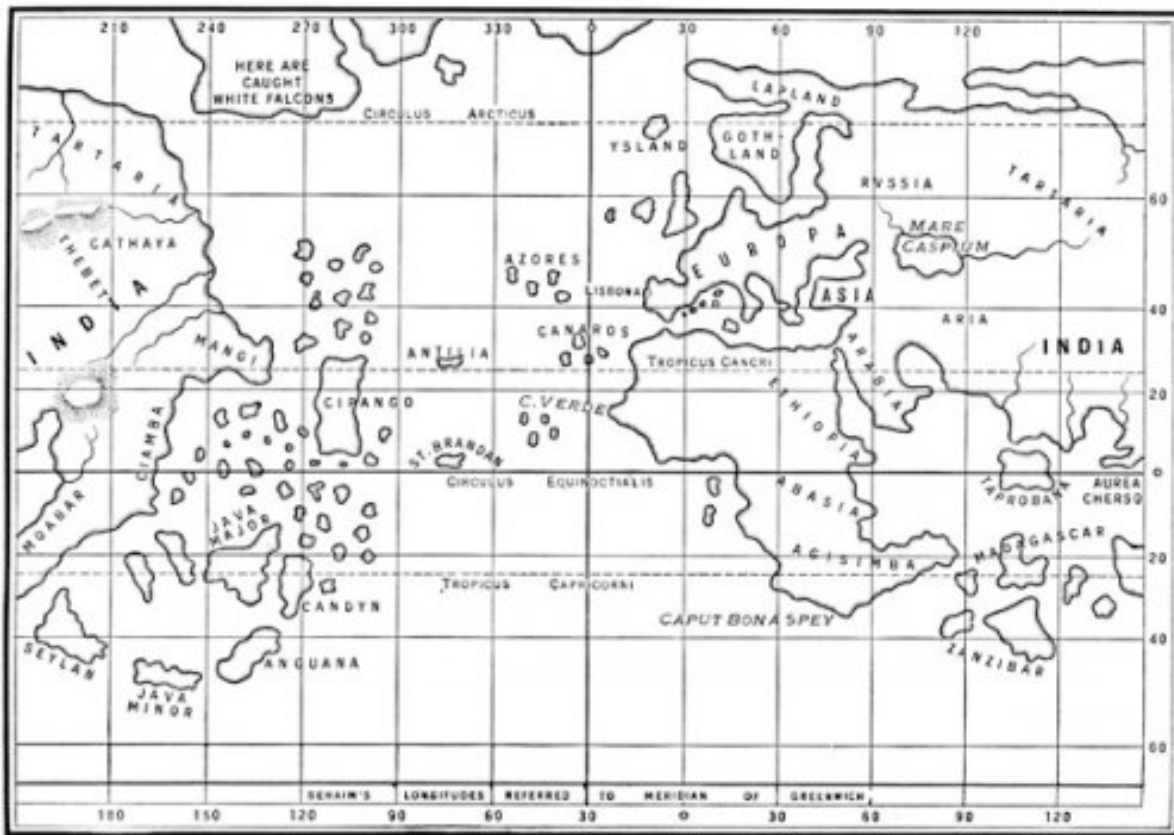


TITLE: *Toscanelli's World Map*

DATE: 1474

AUTHOR: *Paolo Toscanelli*

DESCRIPTION: In the fourth century B.C., Aristotle had said: "The regions round the Pillars of Hercules are in connection with the regions round India, and between them there is nothing but sea." Strabo (first century A.D.) believed that by sailing with an easterly wind in the Western Ocean one "could reach the Indies". About 120 A.D the Roman philosopher Favorinus wrote that the same ocean which the Greeks knew as the *Atlantic Sea* was known in East Asia as the *Great Sea*. Roger Bacon and Albertus Magnus put forward similar views in the 13th century. In the 1470's, Paolo Toscanelli (1397-1482), the Florentine physician and cosmographer, was the earliest known medieval supporter of a westward voyage from Europe to the Far East to portray his theories cartographically. He contended that the Far East could be reached more directly by sailing west than by rounding the Cape of Good Hope and crossing the Indian Ocean. Toscanelli accepted Marco Polo's earliest claim of the elongated Asian continent.



The Greek philosopher Aristotle denied the existence of a landmass separating the extreme east from the remote west. In his view, both ends of the *oikoumene* [known inhabited world] were connected by an unbroken body of water of relatively small range. He confirmed this assumption by the fact that elephants dwelled both in India and in Africa imparting to them remarkable swimming abilities-presumably over short sea stretches-or suggesting a crossing of an unknown land bridge, "there is continuity between the parts about the pillars of Hercules and the parts about India... in this way the ocean is

one. As further evidence in favor of this ... the case of elephants, a species occurring in each of these extreme regions, suggesting that the common characteristic of these extremes is explained by their continuity".

For Eratosthenes (*see monograph #112*), the width of the *Ocean Sea* was close to two thirds of the circumference; the great value of the water barrier (less than 122,000 *stades* or 14,024 miles) put a dilemma before a famous scientist which he was unable to solve: either to deny the possibility of the Atlantic crossing: "*if the extent of the Atlantic Ocean were not an obstacle, we might easily pass by sea from Iberia to India, still keeping in the same parallel*" or to recognize the existence of more than one *oikoumene* in the northern temperate zone there may be two or even more habitable earths, especially near the circle of latitude which is drawn through Athens and the Atlantic Ocean.

In Posidonius' view (*#114*), the uncharted waters occupied the same length as the inhabited world: both measured 70,000 *stades* (43,495 miles). He is certain that the west and the east occupy the opposing shores of the same ocean and ponders about the possibility of such a long voyage: "*starting from the west, one might, aided by a continual east wind, reach India.*"

Strabo, first century A.D. (*#115*) claimed that circumnavigation was possible. He confirmed that nobody had accomplished this tremendous task yet not because of a natural obstacle such as a new continent but due to the lack of provisions and spirit: "*Those who have returned from an attempt to circumnavigate the earth, do not say they have been prevented from continuing their voyage by any opposing continent... but through want of resolution and the scarcity of provision.*"

Seneca in his treatise *Natural Questions* agreed with those who claimed that the ocean should be relatively narrow. He assumed that a well-built ship sailing under fair wind could pass over this water body in a number of days: "*For what after all is the space that lies from India to the farthest shores of Spain? A few days journey if a prosperous wind waft the vessel.*"

The idea of the world ocean also matched the Biblical description of the earth's birthday: "*And God said, "Let the water under the sky be gathered to one place, and let dry ground appear."* And it was so."

This concept became available to Europe in the west in a printed Latin translation of Strabo's *Geography* in 1469, at exactly the same time as Claudius Ptolemy's maps (*#119*). Unlike the geography of the ecclesiastical *mappa mundi* or of the Mediterranean *portolan* sea-charts, Ptolemy's measured world had an unmistakably spherical form. The known, inhabited world occupied slightly more than half of the globe, just over 180 longitude degrees. Ptolemy's approach to geography was strictly scientific and impersonal. He was interested in the earth, all of it, not just the habitable part, and tried to fit it into a scheme of the universe where it belonged. More than any one of the ancients, Ptolemy succeeded in establishing the elements and form of scientific cartography. This he did through his second great treatise, *Geographike Syntaxis*, called by him, "the geographical guide to the making of maps", and, in later centuries, shortened to simply *Geographia*, or (incorrectly) *Cosmographia*. This work is actually the first general atlas of the world to have survived, rather than a "geography" with a long textual introduction to the subject of cartography (*see #119*).

Overall Ptolemy's world-picture extended northward from the equator a distance of 31,500 *stades* [one mile = 9 to 10 *stades*; there has always been some controversy over the equivalent modern length of a *stade*] to 63° N at Thule, and southward to a part of Ethiopia named *Agysimba* and *Cape Prasum* at 16° S latitude, or the same distance south as Meroe

was north. The "breadth" of the habitable world according to Ptolemy then equates to 39,500 *stades* [3,950 miles]. It is remarkable that, while his map is consistently mentioned as reflecting the entire inhabited portion of the globe, there is no indication on any of his world maps of habitation south of *Agysimba*, though there is some hint of his belief/knowledge to the contrary in his criticism of Marinus on this point.

In terms of miles, Martellus (#256) and Behaim (#258) estimated the distance across the Atlantic between Europe and Asia (or India) at about 4,500 miles; the distance between the Canary Isles in the east and *Cipangu* [Japan] in the west was calculated at about 3,000 miles. These "estimates," which must have been influenced by accounts from many Portuguese explorations into the western Atlantic, were fairly accurate. They were also in surprising agreement with the estimated 5,000-mile gap between Europe and *Cathay* which Roger Bacon and Paolo Toscanelli gave for the expanse of the Atlantic. Toscanelli justified his calculation of the distance by referring to an astronomical measurement called the "short degree." A Medieval Arabian cosmographer, Al-Farghani, had underestimated the distance of an equatorial degree at approximately 57 *Arabic miles*. When Toscanelli made his calculations using the even shorter length of a *Roman mile*, the equatorial distance of a degree was set at 45 miles or 15 miles per-degree less than the actual distance (hence the "short" degree). The net result was that all three cosmographers under-calculated.

One of his friends was Fernan Martinez de Roriz, a Portuguese canon who later became King Alfonso's confessor at the Court in Lisbon. It is probable that some time about the beginning of the 1470's, the canon had come to discuss geographical questions with the King, or with Crown Prince João, who was more interested in geography, and then happened to mention Toscanelli's theory about a passage to India across the ocean to the west. At that time the Portuguese believed that they had already reached the southern extremity of Africa, and that the way to the riches of India already lay open before them. But then came the disconcerting news that once past the Cameroons the coast again turned south and continued to do so for mile upon mile; it seems almost as if all hope of ever being able to circumnavigate Africa was abandoned. It was in this situation that the King instructed his confessor to write to Toscanelli and ask him to explain his plans more clearly. Toscanelli answered at some length, enclosing a map of the sea which divided Europe from Asia. The following is a translation of this most important document in its entirety:

To Fernam Martins, Canon of Lisbon, Paulus the Physician [i.e. Toscanelli] sends greetings.

It pleased me to hear of your intimacy and friendship with your great and powerful King. Often before have I spoken of a sea route from here to India, the land of spices; a route which is shorter than that via Guinea. You tell me that His Highness wishes me to explain this in greater detail so that it will be easier to understand and to take this route. Although I could show this on a globe representing the earth, I have decided to do it more simply and clearly by demonstrating the way on a nautical chart. I therefore send His Majesty a chart drawn by my own hand, on which I have indicated the western coastline from Ireland in the north to the end of Guinea, and the islands which lie along this path. Opposite them, directly to the west, I have indicated the beginning of India, together with the islands and places you will come to; how far you should keep from the Arctic Pole and the Equator; and how many leagues you must cover before you come to these places, which are most rich in all kinds of spices, gems and precious stones. And be not amazed when I say that spices grow in lands to the west, even though we usually say the east; for he who sails west will always find these lands in the west, and he who travels east by land will always find the same lands in the east.

The upright lines on this chart show the distance from east to west, whereas the cross lines show the distance from north to south. The chart also indicates various places in India which may be reached if one meets with a storm or headwind, or any other misfortune.

That you may know as much about these places as possible, you should know that the only people living on any of these islands are merchants who trade there.

There are said to be as many ships, mariners and goods there as in the rest of the world put together. Especially in the principal port called *Zaiton* [Marco Polo's *Zaitum*] where they load and unload a hundred great ships of pepper every year, not to mention many other ships with other spices. That country has many inhabitants, provinces, kingdoms and innumerable cities, all of which are ruled by a prince known as the Grand Khan, which in our language means 'The King of Kings', who mainly resides in the province of *Cathay*. His forefathers greatly desired to make contact with the Christian world, and some two hundred years ago they sent ambassadors to the Pope, asking him to send them many learned men who could instruct them in our faith; but these ambassadors met with difficulties on the way, and had to turn back without reaching Rome. In the days of Pope Eugenius, there came an ambassador to him, who told him of their great feelings of friendship for the Christians, and I had a long conversation with the ambassador about many things: about the vast size of the royal buildings, about the amazing length and breadth of their rivers, and about the great number of cities on their banks - so great a number that along one river there were two hundred cities with very long, wide bridges of marble which were adorned with many pillars. This country is richer than any other yet discovered, and not only could it provide great profit and many valuable things, but also possesses gold and silver and precious stones and all kinds of spices in large quantities - things which do not reach our countries at present. And there are also many scholars, philosophers, astronomers and other men skilled in the natural sciences who govern that great kingdom and conduct its wars.

From the city of Lisbon to the west, the chart shows twenty-six sections, of two hundred and fifty miles each - altogether, nearly one-third of the earth's circumference before reaching the very large and magnificent city of *Kinsai*. This city is approximately one hundred miles in circumference, possesses ten marble bridges, and its name means 'The Heavenly City' in our language. Amazing things have been related about its vast buildings, its artistic treasures and its revenues. It lies in the province of *Manji*, near the province of *Cathay*, where the king chiefly resides. And from the island of *Antillia*, which you call the *Island of the Seven Cities*, to the very famous island of *Cipangu* are ten sections, that is 2,500 miles. That island is very rich in gold, pearls and precious stones, and its temples and palaces are covered in gold. But since the route to this place is not yet known, all these things remain hidden and secret; and yet one may go there in great safety.

I could still tell of many other things, but as I have already told you of them in person, and as you are a man of good judgment, I will dilate no further on the subject. I have tried to answer your questions as well as the lack of time and my work have permitted me, but I am always prepared to serve His Highness and answer his questions at greater length should he so wish.

Written in Florence on the 25th of June. 1474.

It is clear that Toscanelli obtained most of his information about "Furthest India" from Marco Polo's book, but he also mentions that an "ambassador" visited Pope Eugenius. Poggio Bracciolini, the Papal Secretary who wrote about Nicolo Conti's travels in India, adds at the end of Conti's narrative: "*There came a man from the northern parts of Upper*

India to the Pope, wishing, on the instructions of his Nestorian Patriarch, to learn of the Christians in the countries of the West. He told of the Grand Khan and of his dominion over nine powerful peoples." This man was probably the ambassador mentioned by Toscanelli, and we shall have to presume that Conti and other travelers who are unknown to us today gave Toscanelli further valuable information. Toscanelli probably based his very exaggerated idea of the size of the world on what Marinus of Tyre had said; this was later to have some very remarkable consequences, for Christopher Columbus corresponded with Toscanelli during this time. He sent Columbus an encouraging reply along with a copy of a letter and map that he had prepared at the request of Afonso, King of Portugal, outlining his ideas. The map by Toscanelli depicted the intervening ocean which Pierre d'Ailly described in his *Imago Mundi* as "the sea is little between the farthest bound of Spain from the east and the nearest of India from the west" and that "this sea is navigable in a few days if the wind is favorable" (#238). Toscanelli sent the letter and maps (or charts) to the King of Portugal in 1474 and to Columbus before 1481. These documents deeply affected the course of Columbus' life and the history of the world. Although copies of Toscanelli's letter has survived, his historic map was lost; but the map can be reconstructed from the text of his letter and from two surviving cartographic works embodying his ideas. These are the 1490 world map of Henricus Martellus (#256) and the 1492 Nuremberg globe of Martin Behaim (#258), the only two extant non-Ptolemaic world maps of the 15th century to be graduated in latitude and longitude and so to convey a precise estimate of the width of the ocean between westernmost Europe and easternmost Asia.

Whether Columbus ever saw any printed or manuscript account of Polo's narrative before 1485 or 1487, at the latest, is uncertain, but it can be readily ascertained from his log of the first voyage that he had seen a letter written by Paolo Toscanelli to a friend of his in Lisbon named Fernando Martinez. It appears that Martinez had written Toscanelli at the request of the king to find out whether Toscanelli thought it would be feasible to reach India by sailing across the Atlantic to the west. There is no evidence that at that time Portugal was endeavoring to reach India by rounding south Africa.

The original of Toscanelli's letter is no longer in existence so far as known, and the only contemporary evidence that it existed is found in a volume in the Colombina in Seville that had belonged to Columbus. At the end of this volume on two leaves the letter in Latin, dated June 25, 1474, is copied together with a letter from Toscanelli to Columbus. This copy, according to Columbus, was a copy of the one that had been sent to Martinez and which had been sent to Columbus himself at some later date, unknown because this second letter of Toscanelli is not dated. It might appear from the contents of it, however, that Toscanelli believed that Columbus was still in Portugal, and indeed he may have been there, but I think it was much more likely that the letter did not reach Columbus until he had gone to Spain. The original letter to Martinez, or the copy of it rather, is nothing but an abstract from some text of Polo's narrative, either manuscript or printed. Besides Toscanelli's extract from Polo's narrative he included in the letter some calculations on the method of reaching *Cathay* and *Cipangu* by sailing to the west. The letter is somewhat ambiguous but with the letter to Columbus he sent a map on a plane projection and Columbus



speaks of it several times in his log. In his letter Toscanelli says that the map is divided into spaces which could only have been five degrees square. There were twenty-six such spaces from Lisbon to *Quinsai*, he said of 250 miles each, that is 6,500 *Italian miles*, or about 5,000 *Spanish miles*. From the island of *Antil* [that is *Antilla*] a purely legendary island, Toscanelli says it is 2,500 miles to *Cipangu*. On that basis it would have been about 4,000 miles from Lisbon to *Antil*. Toscanelli, however, neglected to state how far it was from the mainland to *Cipangu* and this omission cut a great figure later in Columbus' bewilderment when he finally reached the West Indies. When Columbus finally found what he called *Cipangu*, he did not know where the mainland lay because Toscanelli had neglected to state it. Toscanelli's figures amounted to about 130° longitude difference between Lisbon and *Quinsai*, whereas the actual difference is about 220°. He probably figured his 50 miles to the degree on the parallel of about 40° which passes close to Lisbon. As he advised sailing a little south of west he evidently considered *Quinsai* to lie in a lower latitude, which as a matter of fact, is the case. It is the modern Hangchow and is something like 12,000 miles from Lisbon by sailing west. If Columbus had known that the distance was so great he would never have started for it. As it was when he had sailed some 3,000 miles or more he gave up the search, largely I imagine because the crew refused to sail any farther from land.

To Toscanelli the goal was Marco Polo's *Cathay*, and within the intervening ocean he was aware of no considerable land other than the two large islands of *Antillia* and *Cipangu* [Japan]. The former is only on the *Martellus map of 1490* (#256), while both islands are shown on the *Behaim globe of 1492* (#258). The scholar G.R. Crone suggests that the belief that the East could be reached by sailing west was being reconsidered in geographical circles before the second half of the 15th century, possibly in the 14th.

The eastern part of Toscanelli's map, showing the extreme west of Europe and northwest of Africa, is quite accurate, even if the size of the landmasses is exaggerated (in relation to the ghostly projection of the Americas); Portuguese mariners had traveled quite far south along the coast of Africa, and knew about the Azores (rediscovered in 1427). The Canary Islands were conquered by the Castilians from 1402 onwards. Nevertheless, many of the islands pictured here in the western Atlantic Ocean are quite clearly some of the many phantom islands that for a long time were recorded on maps, but were never more than legends. One such example is *Hy-Brasil*, probably one of the islands pictured closest to Ireland.

Another phantom island, mentioned on this map, is *Antillia*, also known as the *Island of Seven Cities* or *St Brendan's Island*, and often used as a synonym for the *Isles of the Blessed* or the *Fortunate Islands*. The muddled legends of *Antillia* have been around since at least Plutarch's time (ca. 74 AD). Its name might be a corruption of Atlantis; or a derivation of *anterioris insula*, Latin for an island located 'before' *Cipangu*; or a transformation of *Jazeera at-Tennyn*, Arabic for 'Island of the Dragon'. Toscanelli on his map uses *Antillia* as the main marker for measuring distance between Portugal and *Cipangu*.



The reference to *Sete Ciudades* ('Seven Cities') is reminiscent of an Iberian legend of seven bishops fleeing the Arab conquest of the peninsula and founding a city each on the island, which became a sort of utopian commonwealth. Some claim the legend of *Antillia* represents an earlier discovery of the islands that eventually became known as the Antilles.

Improving nautical knowledge eventually led *Antillia* to disappear from maps, but the legends surrounding it continued to inspire explorers for a long time - e.g. the 'Seven Cities', that were sought in the southwest of the U.S. or even posited on Cape Breton Island in Canada.

Cipangu (also written as *Cipango*, *Zipangu* or *Jipangu*) is the name by which Japan had been known in Europe since Marco Polo brought home the name of the island. The name derives from an early Chinese word for Japan, *Ribenguo*, meaning 'country of sun origin'. Polo's description of *Cipangu* as being extremely rich in silver and gold triggered the imagination of Europeans for many years to come.

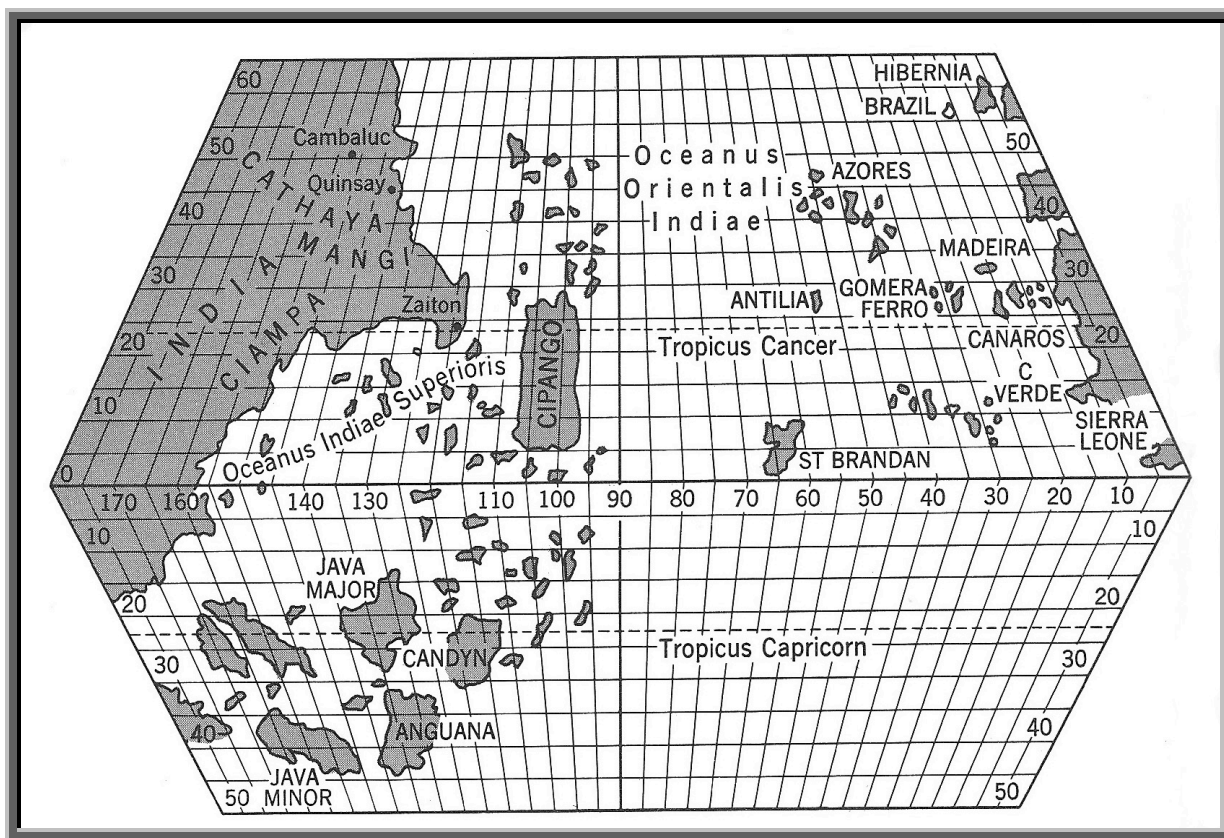
Cathay as a European name for China also derives from Marco Polo, who used it for northern China (southern China being *Manji* in his accounts). *Cathay* probably comes from *Khitan*, a tribe in northern China. Only in the 19th century was the usage in English of *Cathay* eclipsed by the word 'China'. Russian still uses the word - there's still an area of Moscow called *Kitaigorod*, 'Chinatown'.

Taking his departure from a port of the Iberian Peninsula and sailing down into the zone of the northeasterly trade winds, according to Toscanelli a navigator could then lay a course west or southwest on which he would find *Antillia* lying across his bows. These were in fact the courses set by Columbus in the late summer of 1492, and *Antillia* was the first land which he expected to sight on his westward passage from the Canaries, based upon the Toscanelli's reference in his letter to Columbus to "the island of *Antillia* which is known to you", in the latitude of *Cipangu*. A mapmaker who thought in terms of a globe could locate *Antillia* somewhat further west than might be suggested by an ungraduated *mappamundi* or *portolan* chart in which it was drawn at the left-hand edge of the parchment. Toscanelli (as he told Columbus) supposed *Antillia* to lie 35 degrees west of his prime meridian through the Canaries; and it is in just this longitude, a little north of the equator, that Martin Behaim lays down, in his globe of 1492, the *Island of St. Brendan*, with an outline very like that of *Antillia* in the 15th century charts and in the *Vinland* map (#243). Behaim gives it the name *Insula de sant brandan*. This apparent association of *Antillia* and *St. Brendan* in Behaim's mind echoes that in the *Vinland* map (#243). We must note, however, that the globe also shows *Antillia*, as a triangular island lying on the Tropic of Cancer (thus nearly due west of the Canaries) and about 10 degrees east of his *St. Brendan's Island*. This concept is not, in substance, different from that expressed in the relevant part of the *Vinland* map and there copied from a model similar to the *Bianco* world map of 1436 (#241) in which the design is compressed within the limits of the available space at the extreme left of the vellum sheet. Columbus made copious notes on all reports of land or islands in the west that came to his notice, and those were gathered together in the biography by his son Fernando. All the evidence which he could collect indicated that both his objective and the best route thither lay in tropical latitudes. Like Toscanelli, he took *Antillia* to lie on or near the Tropic of Cancer; and if (as we suppose) the world maps he consulted included ones like those by Henricus Martellus in 1489 and 1490, which reflects Toscanelli's views, he could see that a course along the same parallel would bring him to *Cipangu* and to *Mangi*, the "cape of Asia". Toscanelli allowed 85 degrees of longitude between the Canaries and *Cipangu*, Martellus indicated 90 degrees and Behaim showed 110 degrees on his globe.

LOCATION: (*originals lost, exists only as a reconstruction*)

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Reconstruction of Toscanelli's map

