

**TITLE:** *Behaim Globe*

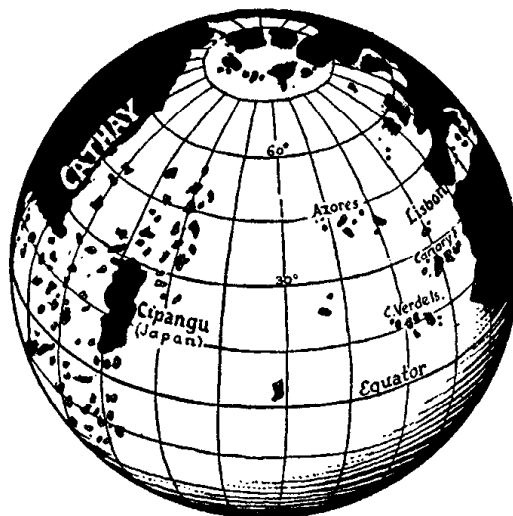
**DATE:** 1492

**AUTHOR:** *Martin Behaim*

**DESCRIPTION:** It was Martin Behaim of Nuremberg (1459-1507), who, in so far as we have knowledge, constructed one of the first modern terrestrial globes, and it may, indeed, be said of his "*Erdapfel*," as he called it, that it is the oldest terrestrial globe extant. Globes in his age, and even earlier, were by no means unknown. Giovanni Campano (fl. 1261-64), a distinguished mathematician of Novara, wrote a *Tractus de Sphaera solida*, in which he describes the manufacture of globes of wood or metal. Toscanelli, when writing his famous letter in 1474 (#252), refers to a globe as being the best adapted for demonstrating the erroneous hypothesis as to the small distance which he supposed to separate the west of Europe from eastern Asia. Columbus, too, had a globe on board his vessel upon which was depicted *Zipangu* [Japan], and which may have been the work of his brother Bartholomew, who, according to Las Casas, produced charts as well as globes. But only two globes of a date anterior to the discovery of the New World have survived, namely this one in Nuremberg, and a smaller one at the *Depôt des planches et cartes de la marine*, Paris (the *Laon Globe*, #259).

Martin Behaim belonged to the merchant class of a flourishing south German city. He took advantage of the opportunities which were offered him for travel, though, according to both E.G. Ravenstein and E.L. Stevenson, it is hardly probable that he is entitled to that renown as an African coast explorer with which certain of his biographers have attempted to crown him, nor does it appear that he is entitled to a very prominent place among the men famed in his day for their astronomical and nautical knowledge. It was doubtless, for reasons primarily commercial, that he first found his way to Portugal, where, shortly after his arrival, probably in the year 1484, he was honored by King John with an appointment as a member of the *junta dos mathematicos* [a nautical or mathematical council]. During his earlier years in Portugal he was connected with one or more expeditions down the coast of Africa, was knighted by the king, presumably for his services, and made his home for some years on the island of Fayal.

In the year 1490 he returned for a visit to his native city, Nuremberg, and there is reason for believing that on this occasion he was received with much honor by his fellow townsmen. It was the suggestion of George Holzschuher, member of the City Council, and himself somewhat famed as a traveler, that eventually brought special renown to this globe maker, for he it was who proposed to his colleagues of the Council that Martin Behaim should be requested to undertake the construction of a globe on which the recent Portuguese and other discoveries should be represented. From a record on the globe itself, placed within the Antarctic Circle, we learn that the work was undertaken on the authority of three distinguished citizens, Gabriel Nutzel, Paul Volckamer, and Nikolaus Groland. It is an interesting fact that we are able to follow in detail the construction of the globe through its several stages, as the accounts of George Holzschuher, to whom was entrusted



the general supervision of the work, have been preserved. From his report, presented at the conclusion of the undertaking, we learn the names of those who participated in the production of the globe; we learn the amount received by each for his labors, and that the total cost to the city for the completed product was something less than \$75. Information is given therein as to the division of the work; how the spherical shell was prepared; how the vellum covering was fitted to the sphere; how the rings and the globe supports were supplied; finally, how the artist, Glockenthon, transferred the map to the prepared surface of the ball and added to the same the several miniatures, illustrating in rich color a variety of subjects.

**Construction.** The production of the globe involved first the compilation of a map of the world as a guide for the artist employed in painting the globe; secondly, the manufacture of the globe, together with its accessories; thirdly, the transfer of the map to the globe.

The compilation of a printed *mappamundi*, which was used for the globe, naturally fell to the share of Behaim himself. This map was subsequently mounted upon two panels, framed and varnished and hung up in the clerk's office of the town hall. Johann Schöner (#328), in 1532, was paid £5 for "renovating" this map and for compiling a new one, recording the discoveries that had been made since the days of Behaim.

The manufacture of a hollow globe or sphere can hardly have presented any difficulty at Nuremberg, where the traditions of the workshop of Johann Müller (*Regiomontanus*), who turned out celestial spheres, were still alive.

The mould or matrix of loam was prepared by a craftsman bearing the curious name of Glockengiesser, a bell-founder. The spherical shell was the work of Kalperger. Having covered the mould with successive layers of paper, pasted together so as to form pasteboard, he cut the shell into two hemispheres along the line of the intended Equator. The hemispheres were then taken off the mould, and the interior having been given stability by a skeleton of wooden hoops, they were again glued together so as to revolve on an iron axis, the ends of which passed through the two poles. The sphere was then coated with whiting, upon which was laid the vellum that was to bear the design. The vellum was cut into segments resembling the gores of a modern globe, and fitted the sphere most admirably. A smith supplied two iron rings to serve as meridian and horizon, a joiner and a stand, and there was provided a lined cover as a protection against dust. In 1510 the iron meridian was displaced by one of brass, the work of Johann Verner, the astronomer. The wooden stand was superseded about the same time by an elegant tripod of iron.

The important duty of transferring the map to the surface of the globe and illuminating it was entrusted to Glockenthon (and possibly Erhard Etzlaub). This artist spent fifteen weeks over this work. All in all this fine work of art cost the city no more than £13 17s.

For over a hundred years the globe stood in one of the upper reception rooms of the town hall, but in the beginning of the 16<sup>th</sup> century it was claimed by and surrendered to Baron Behaim. This was fortunate, for had it remained, uncared for, in the town hall it might have shared the fate of so many other "monuments" of geographical interest, the loss of which the living generation has been fated to deplore. In November 1907 the globe was





removed from Baron W. Behaim's family mansion in the Egydienplatz to the Germanic Museum.

The globe, in its pristine condition, with its bright colors and numerous miniatures, must have delighted the eyes of a beholder. In the course of time, however, the once brilliant colors darkened or faded, parts of the surface were rubbed off; many of the names became illegible or disappeared altogether. The mechanician Karl Bauer, who, aided by his son Johann Bernhard, repaired the globe in 1823, declared to Ghillany, that it had become very friable (*mürbe*), and that he found it difficult to keep it from falling into pieces. In his opinion it could not last much longer. Yet the globe has survived, and its condition seems in no manner worse than it was when it was under treatment by the Bauers. Indeed, on examining the globe, a beholder may feel surprise at the brightness of much of the lettering. This, however, is due to the action of the " renovators," who were let loose upon the globe in 1823, and again in 1847; who were permitted to work their will without the guidance of a competent geographer, and, as is the custom of the tribe, have done irreparable mischief. As a result numerous place-names have been corrupted past recognition, and if one desires to recover the original nomenclature of the globe we must deal with it as a palimpsest. Such a process, however, might lead to the destruction of the globe, whilst the result possibly to be achieved would hardly justify running such a risk.

The following legend, which is inscribed in German on the globe, gives the history of this important geographical monument:

At the request of the wise and venerable magistrates of the noble imperial city of Nuremberg, who govern it at present, namely, Gabriel Nutzel, P. Volkhamer, and Nicholas Groland, this globe was devised and executed according to the discoveries and indications of the Knight Martin Behaim, who is well versed in the art of cosmography, and has navigated around one-third of the earth. The whole was borrowed with great care from the works of Ptolemy, Pliny, Strabo, and Marco Polo, and brought together, both lands and seas, according to their configuration and position, in conformity with the order given by the aforesaid magistrates to George Holzschuer, who participated in the making of this globe, in 1492. It was left by the said gentleman, Martin Behaim, to the city of Nuremberg, as a recollection and homage on his part, before returning to meet his wife (Johanna de Macedo, daughter of Job de Huerter, whom he married in 1486) who lives on an island (at Fayal) seven hundred leagues from this place, and where he has his home, and intends to end his days.

**Description.** In his scholarly work E.G. Ravenstein describes this remarkable cartographic monument of a period that represented the beginning of a rapid expansion of geographical knowledge (in summary): Martin Behaim's map of the world was drawn on parchment that had been pasted over a large sphere. The globe itself has a circumference of 1,595 mm, consequently a diameter of 507 mm or 20 inches, resulting in a scale of 1:25,138,000. Only two great circles are laid down upon it, the equator, divided into 360 degrees (unnumbered), and the ecliptic studded with the signs of the zodiac. The Tropics, the Arctic and the Antarctic circles are likewise shown and in the high latitudes the lengths of the longest days are given. The only meridian which is drawn from pole-to-pole 80 degrees to the west of Lisbon is graduated for degrees, but also unnumbered. The sea is colored a dark blue, the land a bright brown or buff with patches of green and silver, representing forests and regions supposed to be buried beneath perennial ice and snow. Perhaps the most attractive feature of the globe consists of 111 miniatures, for which we are indebted to Glockenthon's clever pencil. The *Erdapfel* is covered in a cornucopia of beautiful little

illustrative details, including over 100 miniature objects and figures. These include flags, saints, kings on their thrones, animals such as elephants, camels, and parrots; fantastic beasts such as a sea serpent and a mermaid; and boats that share the seas with painted fish. The map art on the surface of the globe took a small team to complete. Foremost among them was the artist Georg Glockendon who, along with the painter Hans Storch, did the actual illustration work. Later, a scribe came in to add some 2,000 place names. Behaim led the construction and provided the cartographic information that informed the illustrations. He took his vision of the world from a number of sources, ranging from the historic geography of Ptolemy to the explorations of Marco Polo. While the globe turned out to be quite beautiful as an object d'art, its accuracy as a geographic instrument was out of date even in 1492.

The vacant space within the Antarctic circle is occupied by a fine design of the Nuremberg eagle with the virgin's head, associated with which are the arms of the three chief captains by whose authority the globe was made, namely, Paul Volckamer, Gariel Nützel and Nikolaus Groland. There are, in addition, 48 flags (including ten of Portugal) and five coats of arms, all of them showing heraldic colors. The miniatures represent a variety of subjects. Forty-eight of them show us kings seated within tents or upon thrones; full-length portraits are given of four Saints (St. Peter, St. Paul, St. Matthew, and St. Iago), of missionaries instructing natives, and of travelers. Eleven vessels float upon the sea, which is populated by fishes, seals, sea lions, sea-cows, sea-horses, sea-serpents, mermen, and a mermaid. The land animals include elephants, leopards, bears, camels, ostriches, parrots, and serpents. Specifically, the only fabulous beings that are represented among the miniatures are a *merman* and a *mermaid*, near the Cape Verde Islands, and two *Sciapodes* in central South Africa, but *syrens*, *satyrs*, and '*men with dogs' heads*' are referred to in some of the legends. Nor do we meet with the '*Iudei clausi*,' [enclosed Jews – Gog and Magog] or with a '*Garden of Eden*,' still believed in by Columbus. There is a curiously faulty representation of the Portuguese arms, especially for someone like Behaim who had lived in and sailed for that country for many years.

The information on the globe is a jumble of antique lore, everything from Pliny to John Mandeville, and the latest news. The most striking feature was its depiction of the Atlantic Ocean, spanning a sailable space between Spain and Asia and marked by two conveniently located islands, the mythical *Antillia* and Japan. The globe's inscriptions, all in German, were a siren song to the wealthy investors of the city of Nuremberg, calling them to seek out the gold, precious stones, furs and spices of distant lands. The longest legend on the map recounted the course of the spice trade from *Java Major* in the Far East, via the Indian Ocean and Red Sea, until the cargo reached western Europe. Behaim pointed out that customs duties were paid twelve times in the course of this voyage, resulting in very high prices. Obviously, eliminating the middleman by sailing west from Europe and avoiding the political and economic minefields of the Indian Ocean would be a profitable course of action. "Let no one doubt," wrote the mapmaker, "the simple arrangement of the world, and that every part may be reached in ships, as is here to be seen".

The globe is crowded with over 1,100 place-names and numerous legends in black, red, gold, or silver. The legends, in the south German dialect of the period, are very numerous, and are of great interest to students of history and of historical geography. However, due to the verities of time, as mentioned above many legends and place-names are illegible. In his book on the life and work of Behaim, Ravenstein provides a complete listing of all decipherable place-names and legends, along with a translation and discussion where his interpretation differs from previous scholars. The following legend, which lies to

the southeast of the Azores Islands, indicates the character of Behaim's numerous legends, in translation it reads:

1,431 years after the birth of our dear Lord, when there reigned in Portugal the Infant Don Pedro, the infant Don Henry, the King of Portugal's brother, had fitted out two vessels and found with all that was needed for two years, in order to find out what was beyond the St. Jacob's Cape of Finisterre. The ships thus provisioned sailed continuously to the westward for 500 German miles, and in the end they sighted these ten islands. On landing they found nothing but a wilderness and birds that were so tame that they fled from no one. But of men or of four-footed animals none had come to live there because of the wildness, and this accounts for the birds not having been shy. On this ground the islands were called *dos Azores*, that is, Hawk Islands, and in the year after, the king of Portugal sent sixteen ships with various tame animals and put some of these on each island there to multiply.

The following legend (in translation) relates to the mythical islands of *Antilia*.

In the year 734 of Christ when the whole of Spain had been won by the heathen of Africa, the above island *Antilia* called *Septa Citade* [Seven Cities] was inhabited by an archbishop from Porto in Portugal, with six other bishops and other Christians, men and women, who had fled thither from Spain by ship, together with their cattle, belongings and goods. 1414 a ship from Spain got near it without being endangered.

Through the inspiration of Behaim the construction of globes in the city of Nuremberg became a new industry to which the art activities of the city greatly contributed. The chief magistrate induced his fellow citizen to give instruction in the art of making such instruments, yet this seems to have lasted but a short time, for we learn that not long after the completion of his now famous *Erdapfel*, Behaim returned to Portugal, where he died in the year 1507.

The main features of interest in the Behaim globe are first the fact that it is a globe and that the maker was therefore obliged to consider directly the width of the ocean between Europe and Asia; second, the strong probability that the outlines adopted on the globe, with the exception of the African coast, were taken from a printed map already fairly widely circulated; third, the persistency with which these outlines were adhered to by later cartographers and their determined efforts to force the new discoveries into this framework. The globe has also great importance in the perennial controversy over the initiation of Columbus' great design and the subsequent evolution of his ideas on the nature of his discoveries.

The former fame of Martin Behaim as a skilled cosmographer has now faded. Ravenstein has shown that Behaim possibly made a voyage to Guinea in 1484-5, but that he was certainly not an explorer of the southern seas and a possible rival of Columbus, and his cartographical attainments were distinctly limited. All the available evidence tends to show that he was a successful man of business who made a certain position for himself in Portugal, and who, like many others of his time, was keenly interested in the new discoveries.

The longitudinal extent of the old world accepted by Ptolemy was approximately 177 degrees to the eastern shore of the *Magnus Sinus* (the Great Gulf that lay to the East of the *Golden Chersonese* [*Malay Peninsula*]), plus an unspecified number of degrees for the remaining extent of China. Behaim accepted more or less Ptolemy's 177° and added 57° to embrace the eastern shores of China. He thus arrived at a total of 234° for the extent of

Eurasia, the correct figure being 131°. The effect of this was to reduce the distance from Western Europe westwards to the Asiatic shores to 126°, in place of the correct figure of 229°. There is no indication on the globe of what Behaim considered the length of a degree to be, but even if he did not go as far as Columbus in adopting the figure of 562 miles for a degree, he presented a very misleading impression of the distance to be covered in reaching the east from the west. Since in addition, *Zipangu* [Japan], in accordance with Marco Polo's report, is placed some 25° off the coast of China on the tropic of Cancer, and the Cape Verde Islands are shown as extending to 30° west of the Lisbon meridian, the distance between them remaining to be navigated is virtually annihilated. Due to limited information about the Spice Islands, Behaim claimed that *Zipangu* was the "*richest island in the Orient in spices and fine gems. There is gold.*" *Zipangu* "*has a particular King, a particular language, and they love idols,*" he continues. To the north are forests bearing nutmeg and pepper, and mermaids are supposed to swim in the waters to the east. All of this information is drawn from Marco Polo's travels, which are cited throughout the map.

The general outline is not unlike that of the *Genoese* map of 1457 (#248); it is also evident that later cartographers, e.g., Contarini (#308) and Waldseemüller (#310) drew on a source common to Behaim for the features of the Indian Ocean and eastern Asia. We are justified in assuming on these and other grounds that Behaim had not gone directly to the authorities he quotes, but had merely amended an existing world map. No special knowledge of Conti's narrative is shown, but a certain Bartolomeo Fiorentino, not otherwise known, is quoted on the spice trade routes to Europe. Southeast Asia is represented as a long peninsula extending southwards and somewhat westwards beyond the Tropic of Capricorn. It is a relic of the continuous coastline that linked Southeast Asia to South Africa in Ptolemaic world maps that displayed a land-locked Indian Ocean, and it needs a name to identify it in argument. It bears a rough resemblance to the hind leg and huge paw of a tiger which is facing west. Arthur Davies, in his discussion of the *Martellus* map (#256) refers to it as the *Tiger-leg* peninsula; in others it is referred to as *Cattigara* and the *Dragon's Tail*. This feature is a remnant of Ptolemy's *Geography* that evolved when the Indian Sea was closed to the surrounding ocean. The placing of Madagascar and Zanzibar approximately midway between this peninsula and the Cape must be another feature of some antiquity. The Fra Mauro map of 1459 (#249) displays far more up-to-date knowledge of this area.

The new knowledge displayed is confined to Africa, or rather to the western coast for the names on the east coast, save for those taken from Ptolemy, are fanciful. The main features of the west coast are more or less recognizable, though Cape Verde is greatly over-emphasized. To *Cape Formoso*, on the Guinea coast the nomenclature differs little from contemporary usage. Beyond it, though a good deal can be paralleled in the two other contemporary sources, Soligo and Martellus (#256), there are elements peculiar to Behaim, e.g. the *Rio de Behemo*, near Cape Formoso, and the *Insule Martini*, identified by Ravenstein with Anobom, with others of a less personal character. The coast swings abruptly to the east at *Monte Negro*, placed by Behaim in 38° S latitude. This is the point reached by Cão in 1483, and its true position is 15° 40' S; a Portuguese standard marks the spot. On the eastward trending coast, there are names that seem to be related to those bestowed by Diaz, and the sea is named *oceanus maris asperi meridionalis* [rough seas of the southern ocean], a phrase which doubtless refers to the storms encountered by him. Owing to the exaggeration of the latitudes, *Monte Negro* falls fairly near the position that the Cape of Good Hope should occupy. It is noticeable that the 1485 Soligo chart ends in 14° S, which is near the limit of Behaim's detailed knowledge. We might conclude, therefore, that Behaim's

contribution was to reproduce this coast from a similar chart, and to add some gleanings from the Diaz voyage round the Cape. The two personal names are not to be found on any other map: in conjunction with the attempt made to associate Behaim's own voyage with the discovery of the Cape, we are justified in assuming that this portion of the globe at least was designed in a spirit of self-glorification. It seems doubtful if Behaim had sailed much further than the Guinea Coast.

**Sources:** Behaim informs us in one of the legends of his globe that his work is based upon Ptolemy's *Cosmography*, for the one part, and upon the travels of Marco Polo and Sir John Mandeville, and the explorations carried on by the order of King John of Portugal, for the remainder. Other sources were, however, drawn upon by the compiler, and several of these are incidentally referred to by him or easily discoverable, but as to a considerable part of his design scholars have been unable to trace the authorities consulted by him.

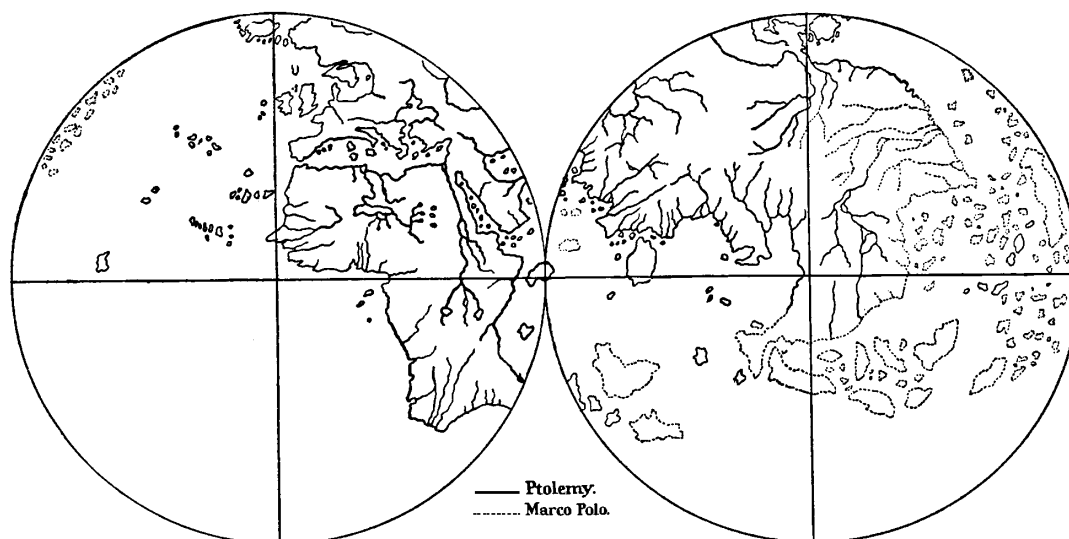
Ptolemy: Behaim has been guided by the opinion of the "orthodox" geographers of his time and has consequently copied the greater part of the outline of the map of the world designed by the great Alexandrian. He has, however, rejected the theory of the Indian Ocean being a *mare clausum* [closed sea] and although he accepted Ptolemy's outline for the Mediterranean, the Black Sea and the Caspian, he substituted modern place names for most of those given by ancient geographers. The edition of Ptolemy of which he availed himself was that published at Ulm in 1482, and reprinted in 1486, with the maps of Dominus Nicolaus Germanus (*see* #119).

Isidore of Seville, or one of his numerous copyists, is the authority for placing the islands of *Argyra*, *Chryse* and *Tylos* far to the east, to the south of *Zipangu* [Japan]. Isidore is also used as a reference to *syrens* and other monsters of the eastern ocean. Behaim, in a legend refers for further information on this subject to Pliny, Aristotle, Strabo and the *Specula* of Vincent of Beauvais. The last, however, merely copied Isidore, whilst the others named did not believe in these monstrosities (*see* #205).

Marco Polo: Surprisingly, Behaim is the first mapmaker to explicitly mention Marco Polo on his work. One cannot fail to be struck by the extent to which the author of the globe is indebted to the greatest among medieval travelers. Accounts, in manuscript, of Polo's travels in Latin, French, Italian and German, were available at the time the globe was being made at Nuremberg, as well as three printed editions. The earliest of these, in German, had appeared in 1477 at Nuremberg; a Latin version, from a translation made by Friar Francisco Pipino of Bologna in 1320, had been published at Antwerp in 1485; and an Italian version printed at Venice by Z. Bapt. da Sessa in 1486. Neither the German nor the Italian version is divided into books and chapters. Pipino's Latin version, on the other hand, is divided in this manner, and Behaim in seven of his legends quotes these divisions correctly. We should naturally conclude from this that this was the version consulted if on other occasions he had not quoted the chapters as given in the version which was first printed in Ramusio's *Navigazioni e viaggi* in 1559. If we add that many proper names are spelled sometimes according to Pipino's version and at others according to that of Ramusio, and that in several instances names are inserted twice upon the globe and separated by hundreds of miles, we may fairly conclude that we have not before us an original compilation, but an uncritical combination of two separate maps designed to illustrate Marco Polo's travels, whose authors, not being skilled cartographers, differed widely as to the localization of the places visited or described by the Venetian traveler. Two instances of this duplication of place-names may be referred to *Bangala*, the well-known province at the mouth of the Ganges, is placed once in the very center of *Cathay* and a second time to the

east of the Indus, both positions being absolutely erroneous. *Vocan* (Wakhan) likewise appears twice, once in *Bactriana* (which is fairly correct), and a second time to the east of the Ganges. Instances of such duplication might be multiplied.

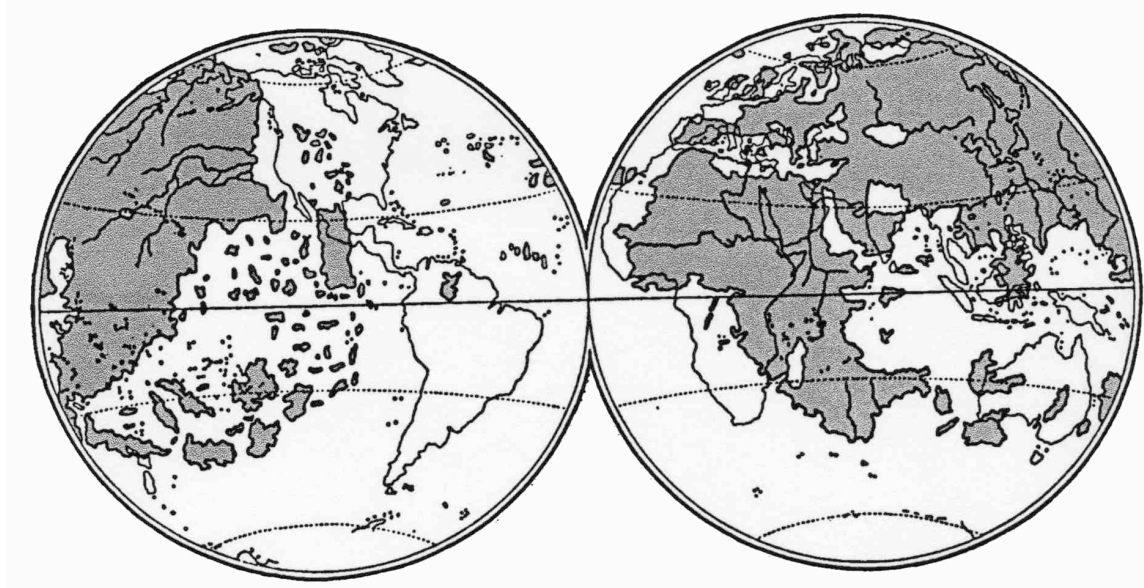
A comparison of this sketch with Behaim's globe, or indeed with other maps of the period, even including Schöner's globe of 1520 (#328), shows clearly that a much nearer approach to a correct representation to the actual countries of Eastern Asia could have been secured had these early cartographers taken the trouble to consult the account which Marco Polo gave of his travels. India would have stood out distinctly as a large peninsula. Sri Lanka though unduly magnified would have occupied its correct position, and the huge peninsula beyond Ptolemy's "Furthest," a duplicated or bogus India, would have disappeared, and place names in that peninsula, and even beyond it, such as *Murfuli*, *Maabar*, *Lac* or *Lar*, *Cael*, *Var*, *Coulam*, *Cumari*, *Dely*, *Cambaia*, *Servenath*, *Chesmakoran* and *Bangala* would have occupied approximately correct sites in Polo's *India maior*.



*Behaim's globe showing his reliance on Ptolemy and Marco Polo*

The only contemporary map upon which the delineation of Eastern Asia including the place names is almost identical with that given on Behaim's globe is by Martin Waldseemüller (#310), and was published in 1507. One may conclude from this that both Behaim and Waldseemüller derived their information from the same source, unless, indeed, we are to suppose that the Lotharingian cartographer had procured a copy of the globe that he embodied in his own design. A comparison of the two shows, however, that such cannot have been the case, for there are many names upon the map that are not to be found on the globe. The source or sources of this delineation of Eastern Asia have not yet been discovered, but if we bear in mind that the outline of the Portuguese chart of 1502 published by Hamy (#307.1) agrees with that of the globe, although its nomenclature is very poor; that on the *Laon* globe (#259) the islands extending from Madagascar to *Candyn* and the duplicated India are identical with these features as shown on Behaim's globe, and that the map of Henricus Martellus (#256) strikingly resembles the globe in the shape given to the duplicated India, we may fairly conclude that the sources drawn upon by Behaim were equally available to his predecessors not only, but also to the author of the Portuguese chart of 1502 and to Waldseemüller. In short, neither Behaim nor any of his contemporaries took the trouble to lay down Marco Polo's routes as described by himself, which would have

resulted in a map very much like that compiled by Ravenstein, but were content to accept or combine the erroneous designs of incompetent older authorities.



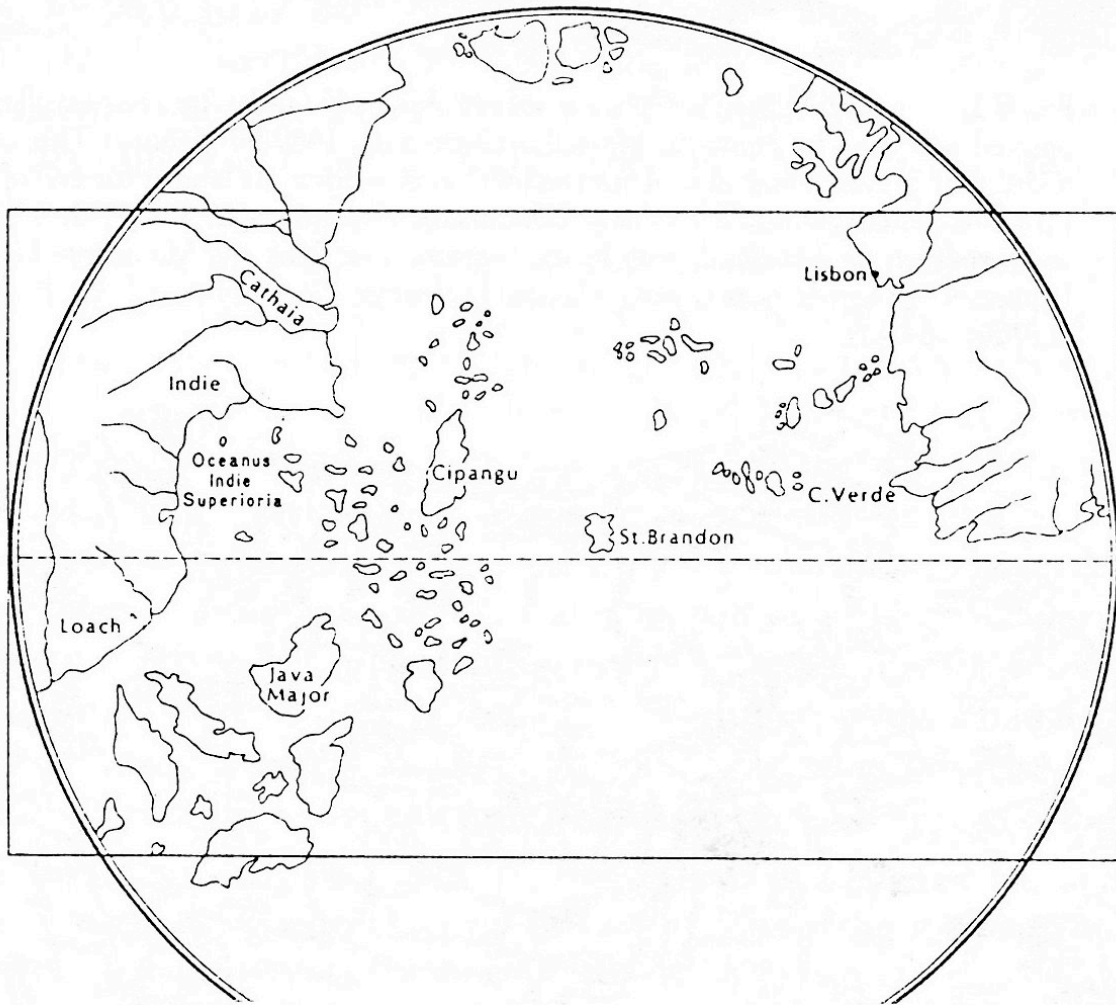
According to Marco Polo's records, the longitudinal extent of the Old World, from Lisbon to the east coast of China, is approximately  $142^{\circ}$ . According to the *Catalan Atlas* of 1375 (#235) this extent amounts to  $116^{\circ}$ , according to the *Fra Mauro* map of 1457-59 (#249) to  $125^{\circ}$ , according to the *Genoese* map (#248) of the same date to  $136^{\circ}$ , Behaim, accepting Ptolemy's calculations cited  $234^{\circ}$ ; the actual extent according to modern maps being  $131^{\circ}$ .

Paolo Tosconelli in 1474 (#252), on the other hand, gives the old world a longitudinal extension of  $230^{\circ}$  thus narrowing the width of the Atlantic to  $130^{\circ}$ . This encouraged Columbus to sail to the west in the confident hope of being able to reach the wealthy cities of *Zipangu* and *Cathay*. The author of the *Laon* globe (#259) went even further, for he reduced the width of the Atlantic to  $110^{\circ}$ . An intermediate position between these extremes is occupied by Henricus Martellus, 1489 (#256), who gives the Old World a longitudinal extent of  $196^{\circ}$ .

In terms of miles, Martellus and Behaim 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. 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.

Toscanelli may be deserving of credit, for having been the first to draw a graduated map of the great Western Ocean, but when we find that he rejected Ptolemy's critique of the exaggerated extent given by Marinus of Tyre to the route followed by the caravans in their visits to *Sera*, and failed to identify Ptolemy's *Serica* with the *Cathaia* of Marco Polo, as

had been done before him by Fra Mauro, we are not able to rank him as high as a critical cartographer as he undoubtedly ranks as an astronomer. He may have been the "initiator" of the voyage that resulted in the discovery of America, but cannot be credited with being the "hypothetical" discoverer of this new world. That honor, if honor it be, in the absence of scientific arguments is due to Crates of Mallos (#110), who died 145 years before Christ, whose *Perioeci* and *Antipodes* are assigned vast continents in the Western Hemisphere, or to Strabo (66 B.C. - 24 A.D., #115), whose "other habitable world" occupies the site of our North America.



Before Columbus sailed, many islands were believed to lie in the unknown ocean west of Europe and east of Cathay and Ind, as shown on this simplified hemisphere sketch map of the Nuremberg globe made by Martin Behaim in 1492. A rectangle has been superimposed to suggest Toscanelli's lost map (#252).

Sir John Mandeville: Jean de Bourgogne, a learned physician of Liege, declared on his death-bed (in 1475) that his real name was Jean de Mandeville, but that having killed a nobleman he had been obliged to flee England, his native country, and live in concealment. This pretended Englishman is the author of a book of travels which W. D. Cooley describes as "the most unblushing volume of lies that was ever offered to the world," but which, perhaps on



that very ground, became one of the most popular books of the age, for as many as sixteen editions of it, in French, German, Italian and Latin, were printed between 1480 and 1492. In the original French the author is called *Mandeville*, in German translations *Johannes* or *Hans von Montevilla*, in the Latin and Italian *Mandavilla*. Behaim calls him *Johann de Mandavilla*, as in Italian, although six editions of his work printed in German, at Strasburg and Augsburg, were at his command. One could conclude from this that he is indebted to an Italian map and not to a perusal of his *Travels* for the two references on the globe. The first of these (near *Candyn*) refers to the invisibility of the Lodestar in the Southern Hemisphere and the *Antipodes*, and is one of the four original statements of the learned doctor, and the second describes the dog-headed people of *Nekuran*, which he has borrowed from Odoric of Portenone and enlarged upon.

Portolano Charts: These nautical [sailing direction] charts were widely distributed in Behaim's time, and the fact that the Baltic Sea (Ptolemy's *Mare Germanicum*) appears on the globe as *Das mer von alemagna*, instead of *Das deutsche Mer*, is proof conclusive that one of these popular charts was consulted when designing the globe or preparing the map which served for its prototype. Further evidence of such use is afforded by the outline given to the British Isles, and possibly also by a few place names in western Africa, which are Italian rather than German or Portuguese.

But while improving Ptolemy's northern Europe with the aid of a *portolano* chart, he blindly followed the Greek cartographer in his delineation of the contours of the Mediterranean, and this notwithstanding the fact that the superiority of these *portolano* charts had not only long since been recognized by all seamen who had them in daily use, but also by the compilers of a number of famous maps of the world, including the *Catalan Atlas* of 1375 (#235), which the King of Aragon presented to Charles V. of France, and whose author may have been Abraham [Hasdai] Cresques, a Jew of Barcelona; a map of 1457, for which we are indebted to the learned Camadulite Fra Mauro (#249), and another of the same date, elliptical in shape, whose unknown author, a Genoese, endeavored to reconcile the, conflicting views of orthodox "cosmographers" and, mariners of experience (#248). Behaim, however, erred in good company, and for years after the completion of his globe the mistaken views of Ptolemy respecting the longitudinal extent of the Mediterranean were upheld by men of such authority as Waldseemüller (1507), Schöner (1520), Gerhard Mercator (1538), and Jacobus Gastaldo (1548). It is curious that not one of these learned "cosmographers" should have undertaken to produce a revised version of Ptolemy's map by retaining the latitudes (several of which were known to have been from actual observation), while rejecting his erroneous estimate of 500 *stadia* to a degree in favor of the 700 *stadia* resulting from the measurement of Eratosthenes (#112).

Toscanelli: The chart which the learned Paolo Toscanelli sent (#252), in 1474, to his friend Fernão Martins has been lost, while the only information to be found in the letter which would enable us to reconstruct it are the statements that on sailing due west from Lisbon, *Quinsay* in *Mangi* [China] would be reached after sailing across 26 "spaces" (of the projection) or 130° of longitude, and that the distance between *Antilia* and *Zipangu* [Japan] amounted to 50°. The distances on Behaim's globe are approximately the same. Some scholars have concluded that Behaim may have copied Toscanelli's chart. This is quite possible, for copies of both the chart and the letter may have been forwarded by Toscanelli to his friend Regiomonhaus at Nuremberg, who had dedicated to him, in 1463, his treatise *De quadratura circuli*.

Portuguese Sources: When Behaim, in the spring of 1490, left Lisbon for his native Nuremberg, Bartolomeu Diaz had been back from his famous voyage round the Cape for over twelve months, numerous commercial and scientific expeditions had improved the rough surveys made by the first explorers along the Guinea coast, factories had been established at *Arguim*, *S. Jorge da Mina*, *Benin* and, far within the Sahara, at *Wadan*, trading expeditions had gone up the Senegal and Gambia, and relations established with Timbuktu, Melli and other states in the interior. In addition to all this, ever since the days of Prince Henry and the capture of Ceuta, in 1417, information on the interior had been collected on the spot or from natives who were brought to Lisbon to be converted to the Christian faith.

There is no doubt that the early Portuguese navigators brought home excellent charts of their voyages. Columbus, who saw the charts prepared by Bartolomeu Diaz, speaks of them as "*depicting and describing from league to league the track followed*" by the explorer. But not one of these original charts has survived, and had it not been for copies made of them by Italians and others, our knowledge of these early explorations would have been even less perfect than it actually is. These copies were made use of in the production of charts on a small scale, the place names upon which, owing either to the carelessness of the draftsmen or their ignorance of Portuguese, are frequently mutilated to an extent rendering them quite unrecognizable. But even of maps of this imperfect kind illustrating the time of Behaim and of a date anterior to his globe, only two have reached us, namely the *Ginea Portugalexe* ascribed to Cristoforo Soligo ca. 1475, and a map of the world by Henricus Martellus Germanus (#256).

Behaim, of course, enjoyed many opportunities for examining the charts brought home by seamen, but also other curious maps, whose existence has been recorded although the maps themselves have long since disappeared. Among maps of this kind was one in the possession of D. Fernando, the son of King Manuel, in 1528, and which had been brought to the famous monastery of Alcoba, ca. 120 years before, i.e., in 1408; another, which D. Pedro, the brother of Prince Henry, had brought from Venice in 1428, and, according to Galviao, upon which was shown the *Fronteira de Africa* and also a *Cola do dragon* [dragon's tail], which has been absurdly identified with the strait discovered by Magellan; the copy of Fra Mauro's famous map, for which King Affonso, in 1459, had paid 62 ducats; the map which had been prepared under the eyes of the learned Diogo Ortiz de Vilhegas of Calzadinha for the guidance of Pero de Covilha in the east; the map of the world, fourteen *palmas* or about 10 feet in diameter, which H. Müntzer, in 1495, saw hanging on a wall of the royal mansion in which he resided as the guest of Joz d'Utra; and lastly, the map which Toscanelli is believed to have forwarded to King Affonso in 1474 in illustration of his plan of reaching *Cathay* and *Zipangu* by sailing across the *Western Ocean*.

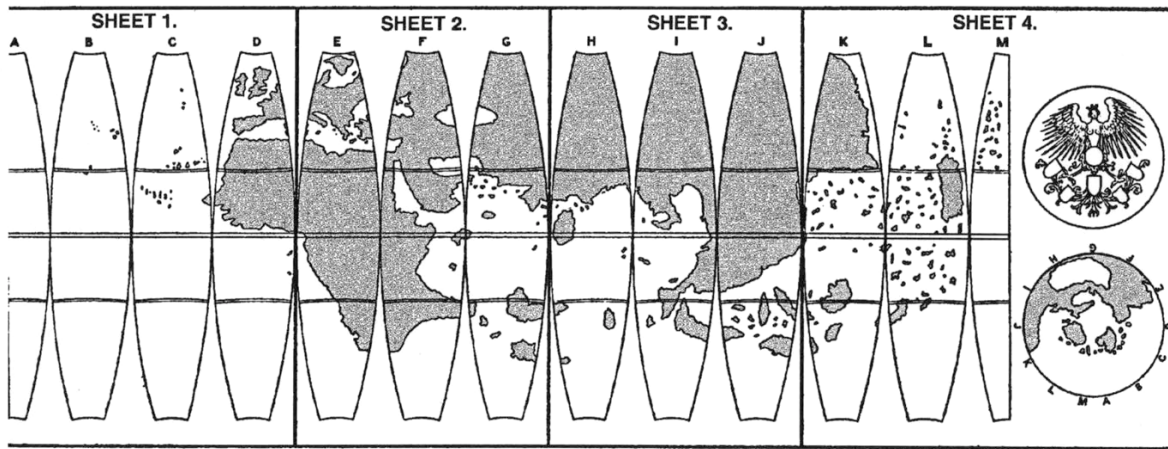
In addition to maps and charts a person of Behaim's social position and connections might readily have had access to the reports of contemporary explorers. He might have learned much from personal intercourse with seamen and merchants who had recently visited the newly discovered regions or were interested in them. His contemporary, the printer, Valentin Ferdinand, was thus enabled not only to consult the manuscript *Chronicle of Azurara*, and the records of Cadamosto (credited with the discovery of the Azores) and Pedro de Cintra (his account of a voyage to Guinea), but also to gather much valuable information from Portuguese travelers who had visited Guinea. Foremost among these was João Rodriguez, who resided at Arguim from 1493-5, and there collected information on the Western Sahara. To Ferdinand we owe, moreover, the preservation of the account that Diogo Gomez gave to Martin Behaim of his voyages to Guinea.

*Miscellaneous Sources:* Foremost amongst these rank the maps in the Ulm edition of Ptolemy (1482), of which Domunus Nicolaus, a German residing in Italy, was the author. Of these maps, that of Scandinavia is a curtailed version of one drawn in 1423 by Claudius Clavus Swartho (Niger), a Dane who lived at Rome. His map shows the actual Greenland as extending from Europe to beyond Iceland. On the map of Nicolaus published in 1482, though not in an earlier edition, Greenland is omitted.

Bartolomeo of Florence, who is said to have traveled for 24 years in the East (1401-1424), but whose name and reputation are other wise unknown, is quoted at length on the spice trade. Behaim's laudable reticence as to *mirabilia mundi* has been referred to already, but he does not disdain to introduce long accounts concerning the "romance" of Alexander the Great, the myth of the "Three Wise Men" or kings, the legends connected with Christian Saints, such as St. Thomas, St. Matthew, St. Apollonius, and St. Brandan or St. Patrick, or the story of Prester John, all of which were popular during the Middle Ages. He quotes *Genesis* (instead of *Kings* ii. 13) in connection with *Ophir*, and refers to St. Jerome's introduction to the Bible.

Behaim had access, likewise, to valuable collections of books and maps, most important among which was the library of the famous Johann Müller of Königsberg (Monteregio), who at the time of his death was engaged upon a revised edition of Ptolemy, which he intended to illustrate with modern maps, including one of the entire world. The library had been purchased in 1476 by his friend and pupil, Bernhard Walther. There are three sections of the globe, upon the origins of which much light might be thrown by the discovery of ancient maps formerly in the possession of John Müller. These are first the region between the Euphrates and Ganges; secondly southeastern Asia with its many islands; thirdly, the greater portion of inner Africa. As to the first it is remarkable that although Ptolemy's outlines of lakes and rivers have been retained, his place names have for the most part been rejected and others substituted. Eastern Asia, with its islands, and Africa have, however, been copied from a map or maps which were also at the command of Waldseemüller (#312). A comparison of that cartographer's map with Behaim's globe leaves no doubt as to this, unless we are prepared to assume that Waldseemüller took his information from the globe, which Ravenstein concludes to be quite inadmissible. It was on the same map that Ritter von Harff, who returned to Germany in 1499 after a pilgrimage to the Holy Land, performed his fictitious journey from the east coast of Africa, across the *Mountains of the Moon* and down the Nile to Egypt. On Behaim's globe may be traced twenty-one names, out of about forty to be found on Waldseemüller's map of 1507, and four of them mark stages of the worthy knight's journey.

But long before Waldseemüller and Behaim, the same old map must have been accessible to Dom. Nicolaus Germanus, for in the map of the world in the edition of Ptolemy published in 1482 he introduces a third head stream of the Nile, which is evidently derived from it.



*Behaim globe goes from Ravenstein*

The following are some examples of the numerous legends to be found on Behaim's globe.

Be it known that on this Apple [Globe] here present is laid out the whole world according to its length and breadth in accordance with the art geometry, namely, the one part as described by Ptolemy in his book called *Cosmographia Ptolemaei* and the remainder from what the Knight Marco Polo of Venice caused to be written down in 1250. The worthy Doctor and Knight Johann de Mandavilla likewise left a book in 1322 which brought to the light of day the countries of the East, unknown to Ptolemy, whence we receive spices, pearls and precious stones, and the Serene King John of Portugal has caused to be visited in his vessels that part to the south not yet known to Ptolemy in the year 1485, whereby I, according to whose indications this Apple has been made, was present. Towards the west the Sea Ocean has likewise been navigated further than what is described by Ptolemy and beyond the *Columns of Hercules* as far as the islands Faial and Pico of the Azoreas occupied by the noble and valiant Knight Jobst de Hürter of Moerkerken, and the people of Flanders whom he conducted thither. These islands are occupied by my dear father-in-law, who owns and governs it. The far-off places towards midnight or *Tramontana*, beyond Ptolemy's description, such as Iceland, Norway and Russia, are likewise now known to us, and are visited annually by ships, wherefore let none doubt the simple arrangement of the world, and that every part may be reached in ships, as is here to be seen.

The ocean on Behaim's globe surrounds the continental mass of land, though covered around the North Pole with many large islands, so that in order to proceed from Iceland direct to the north coast of Asia it is necessary to pass through a narrow strait. The Arctic Ocean, called *das gesore mer septentrionel* [the frozen sea of the North] is surrounded on all sides by land. It is the *Mare concretum* of Pierre d'Ailly's *Imago mundi*, and of the Ulm edition of Ptolemy printed in 1482.

The polar regions appear on Behaim's globe as a group of islands divided by channels draining into a polar ocean, in accordance with the theories of the 14<sup>th</sup> century work *Inventio Fortunatae* (to which Behaim referred). Although this globe conformed very closely to the 1484 and 1486 Ulm editions of Ptolemy's *Geographia*, the Danish geographer A. A. Bjørnbo thought Behaim may have had special knowledge about the real Greenland and its actual location, because he showed a certain amount of independence in the jumble

of place-names surrounding northern Norway, and because the information he provided about Iceland was "mainly correct" and in part new to cartography.

The circumpolar area of Behaim's globe contains what he presumed to be the northern edge of the Eurasian continent. It provides considerable detail, not just the "edge of the world" found on most other maps of the time. Let us examine Behaim's depiction of northernmost Asia. The most striking feature is the great inland "*Frozen Septentrional Sea*," a feature completely foreign to any reality inside Asia. The Ruysch map (#313) shows a similar inland sea of almost identical shape labeled *Mare Sugenum*, [Indrawing Sea.] This name was used by Cnoyen in the singular at one place referring to a sea "*beyond Grocland*" and otherwise in the plural to refer to the channels between the *Septentrional Isles*.

Scandinavia and the northwest part of Behaim's Arctic coast are based on his predecessors' interpretations of Claudius Clavus. But there is no known precedent in the history of cartography for Behaim's central Arctic coast.

The North Sea, the *Oceanus Germanicus* of Ptolemy, is described as *das engelis mere* [the English Sea], for by that name it was known to the sailors of Scandinavia and of northern Germany. The Baltic, the *Mare Germanicum* of the learned, is called *das mer von alemagna*, [the German Sea], which proves conclusively, according to Ravenstein, that Behaim in delineating that part of the world was guided by an Italian or Catalan *portolano* chart.

The Southern Atlantic is called *oceanus meridionalis*. On the voyage thither, to the south of Cape Verde and the Cape Verde Islands, we meet with the following legend:

Be it known that the sea called Ocean, between the Cape Verde Islands and the mainland, runs swiftly to the south; when Hercules had arrived here with his ships and saw the declivity (current) of the sea he turned back, and set up a column, the inscription upon which proves that Hercules got no further. Afterwards the writer of this was sent further by the king of Portugal, in the year 1485.

The *Pillars of Hercules* originally stood on the island of *Gades* [Cadiz], outside the Straits of Gibraltar, but in proportion as geographical knowledge extended so were these columns pushed ahead.

On a *Catalan-Estense* map of 1450 (#246), there are two small islands off Cape Verde described as *Illa de cades: asi posa ercules does colones* [Cades Island where Hercules set up two columns], and on Fra Mauro's famous map of 1459 (#249) a legend to the south of *Cabo rosso* tells us that he had heard from many that a column stood there with an inscription stating that it was impossible to navigate beyond.

Diogo Gomez, an old mariner, well known to Behaim, to whom he presented his account *De prima inventione Guineae*, tells us that João de Castro, on his homeward voyage in 1415, had to struggle against the current which swept round *Cabo de Non*, upon which Hercules had set up a column with the well-known legend, *quis navigat ultra caput de Non revertetur aut non* [He who sails beyond the head (Cape Non) no longer returns].

Gregory of Nyssa (died 395) already knew of the existence of this current, which he ascribed to the excessive evaporation caused by the great heat of the southern sun and the absence of evaporation in the cool north. Albertus Magnus (died 1280) in his *Meteorologia* ascribed the current to the same cause, namely, a difference in the level of the ocean due to differences of evaporation, but believed the current thus produced to be steady and almost imperceptible. The actual velocity of the current to the south of Cape Non varies from .5 to 1.25 knots an hour.

Off the southern extremity of Africa, below a huge fish, is written *oceanus maris asperi meridionalis* [rough seas of the southern ocean], perhaps with reference to the experience of Bartholomeu Diaz when within the influence of the “brave forties.”

The Indian Ocean (*Mare Indicum*, and *oceanus Indicus* of Ptolemy), is divided into a Western Indian Ocean, *oceanus Indicus occidentalis*, an Ocean of Upper India: *oceanus Indie fuperioris* off *Mangi*; and an Eastern Indian Ocean, *oceanus orientalis* and *oceanus orientis Indies*, or *orientalis Indiae*, to the east of the meridian of *Zipangu*.

Behaim's *Sinus arabicus* corresponds to our Gulf of Aden, and this gulf as well as the *das rod mer* [the Red Sea], is, of course, colored red. Ptolemy's *Sinus Persicus* is called *Dafz meer Persa* and his *Hyrceanum mare* is called *das hyrkanifche mer*.

### The Islands of the Atlantic.

*Iceland*: The story of the Icelanders selling their dogs and giving away their children is a fable invented by English and Hanseatic pirates and merchants, who kidnapped children, and even adults, and sold them into slavery. As an instance may be mentioned the misdeeds of William Byggeman, the captain of the 'Trinity,' who was prosecuted in England in 1445, for having committed this offense.

In Iceland are handsome white people, and they are Christians. It is the custom there to sell dogs at a high price, but to give away the children to (foreign) merchants, for the sake of God, so that those remaining may have bread.

Item, in Iceland are to be found men eighty years of age who have never eaten bread, for corn does not grow there, and instead of bread they eat dried fish.

On the island of Iceland they catch the cod that is brought into our country.

*Insula de Brazil*: The imaginary *Jnfula de brazil*, to the west of Ireland, appears for the first time on Dulcert's chart (1339). Subsequently, in the *Medicean Portolano Chart* of 1351 (#233), it figures as one of the Azores, usually identified with *Terceira*, a cape of which still bears the name of *Morro do Brazil*. Later charts, like that of Pizzigani (1367), contained three islands of the name, the one furthest north lying to the west of Ireland. It is this northern island that retained its place on the maps until late in the 16<sup>th</sup> century, and, together with the islands of *St. Brandan* and of the *Septe citez* [the Seven Cities] it still appears on Mercator's chart of the world in 1587. It is this northern island that was searched for in vain between 1480 and 1499, and figures on Behaim's globe.

*The Azores*: *Jnfula delanz michel* [Ilha de S. Miguel], shown with the Portuguese flag. We are told nothing about the “burning mountain” and the great earthquake which happened in 1444.

*neu flandern, oder Infula de faial* [New Flanders or Ilha do Fayal]. Two flags fly above these islands from the same flagstaff, the upper one with the arms of Nuremberg, the lower with those of Behaim. Two more flags are merely shown in outline and may have been intended for the arms of Portugal and Hurter. These skeleton flags are omitted on the Paris (Jomard) facsimile of the globe.

*Jnfule de flores, ilha das Flores.* A sea-horse and four vessels sailing to the west are shown to the south of Flores. The following legend to the northeast of the Azores has been added after Behaim's death: *Martin Behaim died at Lisbon in the year of the Lord 1506 on the 29<sup>th</sup> July.*

*Antilia:* An imaginary island of *Antilia* (also spelled, *Antillia*) has found a place upon the charts since the 14<sup>th</sup> century and was at an early date identified by the Portuguese with the equally imaginary *Ilha de sete cidades* [the island of the seven cities] where the Archbishop of Oporto with his six bishops is imagined to have fled after the final defeat of King Roderick of the Visigoths on the Guadalete in 711 and the capture of Merida in 712 by the Arabs.

The historian Galvao (1862) reports that in 1447 a Portuguese vessel, driven westward by a storm, actually arrived at the island, the inhabitants of which still spoke the Portuguese tongue; other voyages to this island in the time of Prince Henry are referred to in the *Historie* of Fernand Colombo. These voyages, however, are purely imaginary, or, at all events, led to no actual discoveries. It is certain, however, that Fernão Telles, in 1475, and Fernão Dulmo, in 1486, were authorized to sail in search of this imaginary island.

*Antilia* on the ancient maps is a huge island, quadrangular in shape, resembling in all respects the *Zipangu* of Behaim's globe. The *Antilia* of the globe, on the other hand, includes two islands, which seem to represent the *ciertas islas* depicted on Columbus's chart.

In the year 734 of Christ, when the whole of Spain had been won by the heathen [Moors] of Africa, the above island *Antilia*, called *Septe citade* [Seven cities], was inhabited by an archbishop from Porto in Portugal, with six other bishops, and other Christians, men and women, who had fled thither from Spain, by ship, together with their cattle, belongings and goods. 1414 a ship from Spain approached near it without being endangered.

*St. Brandon's Island:* The legend of the Irish abbot St. Brandon, who, after a seven years' peregrination over a sea of darkness, penetrated to an Island of Saints, a *terra repromissionis sanctorum*, was very popular during the Middle Ages. A German version of the legend, *Sant Brandon's buch*, was printed by A. Sorg at Augsburg in 1476, and *St. Brandon's Island* retained a place upon the maps, notwithstanding Vincent of Beauvais' disbelief in the legend, until the days of Ortelius (1570) and Mercator; and as late as 1721 the Governor of the Canaries sent out a vessel to search for this imaginary island. *St. Brandon's Island* is generally associated with the Canaries, as on the *Hereford* map of 1280 (#226), but Dulcert's *Insulla Scti Brandani sive puellarum* (1339) lies further north, while Pizzigani's San Brandany y ysole Pouzele lie far to the west (1367). The following legend appears near *Jnfula de fant brandan* [St. Brandon's Island].

In the year 565 after Christ, St. Brandon in his ship came to this island where he witnessed many marvels, and seven years afterwards he returned to his country.

*Scandinavia:* This area is almost wholly copied from a map in the Ulm edition of Ptolemy published in 1482. The author of the globe was well aware that the three northern kingdoms, since the Union of Calmar (1397), were ruled by the King of Denmark, for the standard of that kingdom flies at the mouth of the Elbe, at the westernmost point of Norway and on Iceland.

- *tennzark* , Denmark and *Coppenhagen*, with a miniature of the king.
- *nord.wege* , Norway.
- *bergn*, Bergen, the well-known trading town.
- *thyle*, an island on the coast of Norway (Telemarken) is undoubtedly meant to represent the *Thule* of Pytheas of Massilia, although that island is more correctly identified with Shetland, known to sailors.

### The Indian Ocean and its islands:

Marco Polo in the 38<sup>th</sup> chapter of the third book states that the mariners had verily found in this Indian Ocean more than 12,700 inhabited islands, many of which yield precious stones, pearls and mountains of gold, whilst others abound in twelve kinds of spices and curious peoples, concerning whom much might be written.

Here are found sea-monsters, such as *Sirens* and other fish. And if anyone desires to know more of these curious people, and peculiar fish in the sea or animals upon the land, let him read the books of Pliny, Isidore (of Seville), Aristotle, Strabo, the *Specula* of Vincent (of Beauvais) and many others.

There he shall find accounts of the curious inhabitants, of the islands, the monsters of the ocean, the peculiar animals on the land and of the islands yielding spices and precious stones.

*Taprobana*: with a royal tent.

Many noble things are said about this island in ancient histories, how they (the inhabitants) helped Alexander the Great and went with the Romans to Rome in the company of the Emperor Pompey. This island has a circuit of 4,000 miles, and is divided into four kingdoms, in which is found much gold and also pepper, camphor, aloe wood and also gold sand. The people worship false gods: they are tall, stout men, and good astronomers.

*Seiland* [*Sri Lanka*]:

The island *Seilan*, one of the best islands in the world, but it has lost in extent to the seas. In this island *Seilan* are found many precious stones and oriental pearls. The King of this island possesses the largest and finest ruby ever seen in the world. The people, men and women, go naked. No corn grows there, only rice. Its king is subject to no one, and they pray to false gods. The island *Seilan* has a circuit of 2,400 miles as is written by Marco Polo in the 19<sup>th</sup> chapter of the third book.

Item, in past times the great Emperor of Cathay sent an ambassador to this King of *Seilan*, asking for this ruby and offering to give much treasure for it. But the King replied that this stone had for a long time belonged to his ancestors, and it would ill become him to send this stone out of the country. The ruby is said to be a foot and a half in length and a span broad, and without any blemish.

*The Three Holy Kings and Prester John*: The three “holy kings “ whose bones are exhibited to credulous visitors at Cologne Cathedral and whose memory is revived annually on Twelfth Day, were undoubtedly the *King of Tarshish and the Isles*, and the *Kings of Sheba and Saba*, of *Psalm xxii*. It was not doubted that these “kings” were descended from the three wise men from the East, who, according to *Matthew ii. 1-10*, were guided by a star to Bethlehem, and there worshipped the newborn “King of the Jews.” The Venerable Bede (died 735) already knew that the names of these kings were Caspar, Melchior and Balthasar. John of Hildesheim (died 1375) wrote a popular account of their story, which was first printed in German in 1480.



Closely connected with the legend of the *Three Kings* is the reported existence of a powerful Christian Prince, *Presbyter* or *Prester John*, in the center of Asia. This rumor first reached Europe through the Bishop of Gabala in 1145, and it was supposed that this Royal Priest was a direct successor or descendant of the Three Kings. Dr. Oppert believes that this mysterious personage was Yeliutashe of the Liao dynasty, which ruled in Northern China from 906 to 1125. Having been expelled by the Koreans, Yeliutashe went forth with part of his horde, and founded the Empire of the Kara Khitai, which at one time extended from the Altai to Lake Aral, and assumed the title of Korkhan. The King George in *Tenduk*, whom Marco Polo describes as a successor of *Presbyter John*, was actually a relative of this Yeliutashe who had remained in the original seats of the tribe not far from the Hwang-ho, and of Kuku-kotan, where the Kutakhtu Lama of the Mongols resided when Gerbillon visited the place in 1688. It was this King George whom Friar John of Montecorvino claims to have converted in 1292.

The Tarshish of the Psalmist must be sought in the East, in maritime India, and not at Tartessus in the West; Sheba was in Southern Arabia, and Saba on the authority of Marco Polo probably in Persia. *Saba Ethiopie*, however, in course of time, was transferred to *Abyssinia*, and its Christian ruler was accepted as the veritable and most popular *Prester John*. Friar John of Marignola (1338-53) is the first traveler who mentions an "African archpriest," and on a map of the world that Cardinal Guillaume Filastre presented in 1417 to the library of Reims we read *Ynde Pbr Jo* at the easternmost cape of Africa.

On Behaim's globe the *Three Kings* are localized in Inner Asia, on the Indian Ocean and in East Africa (Saba). *Tarsis*, with a picture of a town, "*One of the Three Holy Kings of Tarsis, called . . .*" with a royal tent surmounted by a flag exhibiting three Negro heads. Far to the north are the Three Kings conversing with a traveler. *Tarsis* (Tarssia) is shown on many medieval maps in a similar position, for instance, on the *Catalan Atlas* of 1375, where the three kings are shown on horseback about to start for Bethlehem. Haiton is the authority for placing *Tarsis* in this position.

The following legends refer to one of the kings reigning on the Indian Ocean. Opposite the island of *Taprobana* we read: *One of the Three Holy Kings of India*. Beyond the *Sinus magnus* of Ptolemy is the following legend:

Here in these mountains called Vaus, upon which .... on this mountain, the *Mons victorialis* (called *Mount Gybeit* by John of Marignola) the *Three Kings* watched for the appearance of the star which, according to Balaam's prophecy (Numbers xxiv. 17), "should come out of Jacob," and which guided them to Bethlehem.

The third of the Holy Kings is located in East Africa, near the mouth of the Red Sea. Here is a royal tent with the following legend: *The kingdom of one of the Three Holy Kings, him of Saba*.

Below this we read *Saba*, which clearly stands for *Shoa* or *Shewa*, and to the west is a picture of this *Prester John of Abassia* with a kneeling figure in front of him. The following legends refer to *Presbyter John*. Marco Polo is the authority for the first of these legends, which locates the Presbyter in *Tenduk*, at Thian-te-kiang on the Hwang-ho, to the southwest of Kuku-hotan.

In this country resides the mighty Emperor known as Master John, who is appointed governor of the three holy kings Caspar, Balthazar and Melchior in the land of the Moors. And his descendants are good Christians, as are also many kings who are under them.

Og to the west and *Magog* to the south of *Tenduk* are described by Marco Polo as being subject to the *Prester*. These are the tribes of the *Apocalypse* (xx. 8), but Polo says that they are known to the natives as *Ung and Mongul*, that is, the *Un-gut*, a Turkish tribe, and the Mongols. To the east of *Tenduk* we read:

The country towards midnight is ruled by the Emperor Mangu, khan of Tartary, who is a wealthy man of the great Emperor, the Master John of India, the wife of the great King is likewise a Christian.

Mangu-khan ruled 1251-59. He was a grandson of Chinghiz-khan and Kublai's elder brother. The above information as well as that given in the remaining legends may have been taken from Mandeville, who himself is indebted to Haiton, Friar Odorico and others. In the *Sinus magnus* of Ptolemy we also read: *This sea, land and towns all belong to the great Emperor Prester John of India.*

### **Polar Regions.**

The polar regions appear on Behaim's globe as a group of islands divided by channels draining into a polar ocean, in accordance with the theories of the 14<sup>th</sup> century work *Inventio Fortunatae* (to which Behaim referred) and with Mercator's mid-16<sup>th</sup> century ideas (#407). Although this globe conformed very closely to the 1484 and 1486 Ulm editions of Ptolemy's *Geographia*, the Danish geographer A. A. Björnbo thought Behaim may have had special knowledge about the real Greenland and its actual location, because he showed a certain amount of independence in the jumble of place-names surrounding northern Norway, and because the information he provided about Iceland was "mainly correct" and in part new to cartography.

If we compare Behaim's efforts in 1492 with the *Columbus Paris* map (#257) and with the Catalan map of 1480 and Ruysch's world map of 1508 (#313), it is hard to credit him with any special insights that had not long been available to many Englishmen and Portuguese in the codfish business. Iceland may have been only slightly more real to Behaim than the *Antilia* he also put on the globe he made after spending several years in the Azorean island of Terceira, a hub of commerce and exploration.

Late in the summer of the year Behaim made his globe in Nuremberg, the Genoese navigator Christopher Columbus set off on his first great voyage to the "Indies" on behalf of Spain, but with navigational ideas that had been formed in the Portuguese environment of 1476-85. He sailed on Spain's behalf because he had failed to interest either the English or the Portuguese monarchs in his grand scheme. Henry VII had other pressing concerns, and the Portuguese were already managing very well in the field of exploration. Four years before Columbus and his crew reached the Caribbean, Bartolomeo Dias had culminated the Portuguese probe down the west coast of Africa by rounding the Cape of Good Hope, at the same time as Pedro de Covilha had sailed south along the east coast of Africa and sent a message that the sea route to India was feasible. When word spread in Europe that Columbus' voyage had also been successful, it represented a welcome triumph for the Spanish monarchs whose charter Columbus carried.





In the southern hemisphere embedded in other legends is the following:

All this land, sea and islands, countries and kings were given by the Three Holy Kings to the Emperor Presbyter John, and formerly they were all Christians, but at present not even 72 Christians are known to be among them.

Mandeville, says that 72 provinces and kings were tributaries of Prester John, on the authority of an apocryphal letter supposed to have been sent to Manuel Commenus (1143-80), the Pope and others.

*Zipangu insula*: Japan. There is a royal tent. At its southern extremity are shown a *moscat nuswalt* [nutmeg forest] and a *pfeffer walt* [pepper forest]. The following legends are on the island itself:

The island Zipangu has a King and language of its own; the inhabitants worship idols. Zipangu where grows much gold.

Zipangu is the most noble and richest island in the east, full of spices and precious stones. Its compass is 1,200 miles (off the southern extremity). In this island are found gold and shrubs yielding spices (off the east coast). This island Zipangu lies in the west of the world. The inhabitants worship idols. The King is subject to no one. In the island is found exceeding much gold and likewise precious stones and pearls. This is stated by Marco Polo of Venice in his third Book.

**Conclusion:** Behaim is no doubt indebted to his globe, and to the survival of that globe, for the great reputation that he enjoys among posterity. But while the undoubted beauties of that globe are due to the miniature painter Glockenthon, according to Ravenstein the purely geographical features do not exhibit Behaim as an expert cartographer, if judged by modern standards. He was not a careful compiler, who first of all plotted the routes of the travelers to whose accounts he had access, and then combined the results with judgment. Had he done this, the fact of India being a peninsula could not have escaped him; the west coast of Africa would have appeared more accurate. His delineation is rather "hotch-potch" made up without discrimination from maps that happened to fall in his hands. In this respect, however, he is not worse than are other cartographers of his period: Fra Mauro and Waldseemüller, Schöner and Gastaldo, and even the famous Mercator, if the latter be judged by his delineation of Eastern Asia.

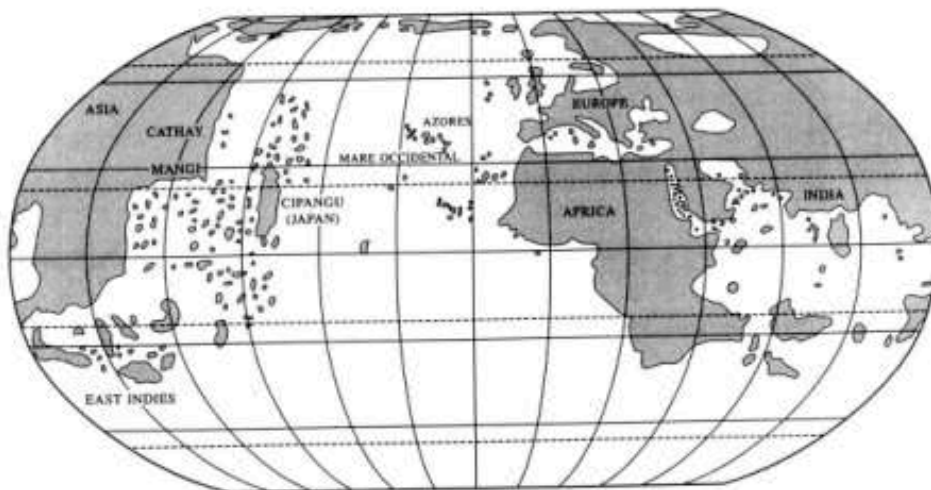
The globe's luxurious decoration shows 100 pictorial illustrations plus 60 banners and coats of arms, more than 2000 place names, and more than 50 long legends. The Behaim globe is one of the very few existing cartographical works where different traditions of late medieval mapmaking are bound together.

But we may well ask whether greatness was not in a large measure thrust upon Behaim by *injudicious panegyrists*; and if, on a closer examination of his work, he does not quite come up to our expectations, they, at all events, must bear the greater part of the blame. The globe by Behaim was designed to demonstrate the ease with which one could sail westward to Japan and China, to the *Zipangu* and *Cathay* of Marco Polo. It showed *Zipangu* as only 80 degrees to the west of the Canaries and *Cathay* some 35 degrees more. Behaim had hopes of leading a voyage westward to Asia and sought the backing of the Emperor Maximilian. The Emperor shrugged it off by passing it on to King John of Portugal in a letter written by Dr. Monetarius, dated 24 July 1493:

Maximilian, invincible King of the Romans, who, through his mother, is himself a Portuguese, intended to invite Your Majesty through my simple letter to search for the eastern coast of the very rich Cathay . . . At your pleasure you can secure for this voyage a companion sent by our King Maximilian, namely Don Martin Behaim, and many other expert mariners, who would start from the Azores islands and boldly cross the sea.'



This was virtually identical with the proposals of Columbus to Portugal in 1485. Unknown to Behaim, Columbus had discovered the Bahamas and the Antilles and had returned to Spain by March 1493. It sets a problem: two men with identical plans to reach Asia, at the same time in history and with similar cosmographical concepts. Columbus, in the copy of the Toscanelli letter (made on the flyleaf of the *Historia Rerum* of Pope Pius II) gave *Cathay* as 130° west of Lisbon and *Zipangu* as ten spaces, or 50°, west of the legendary island of *Antillia*. On 15<sup>th</sup> century maps, *Antillia* was placed at 30° to 35° west of Lisbon so that Columbus made *Zipangu* extend from 80° to 85° west of Lisbon. As previously mentioned, Behaim went to Lisbon in 1484, and soon was in high favor with King John who placed him on his mathematical junta and knighted him in February, 1485. It was this *junta* that reported on the proposals of Columbus to sail west to *Zipangu* and *Cathay* and rejected them during that summer. Behaim had ample opportunity to study the proposals of Columbus and the map(s) that accompanied them. This was the origin of Behaim's later plan to sail to Asia and the source of his concepts of the distances involved. Both were carbon copies of the ideas and map of Columbus. No criticism of Behaim is implied. As far as he knew in 1492, Columbus had not gained support for his enterprise in Portugal or Spain and there was no logical or moral reason why he should not seek German support.



When Columbus first submitted his "Enterprise of the Indies" to the Portuguese king in 1484, the members of such a committee rejected the plan as unfeasible. They held that it violated known theory on the size of the globe and land. The exact date of Behaim's membership in the committee and whether he was among those who considered Columbus' proposal are unknown. Behaim presumably would have been voting on the other side, in favor of the proposal. It is not certain if Columbus and Behaim ever met one another. Nevertheless, a body of indirect evidence suggests that they may have at least been aware of each other's efforts. They had identical small estimates of the size of a degree, and Behaim later desired to undertake the westward voyage after Portugal had rejected Columbus' scheme a second time. Behaim's overall coastlines and land-to-sea ratio are similar to those of a Henricus Martellus map of ca. 1489 (#256), the parameters of which are believed by some to have inspired Columbus. We can see rather convincingly from

Behaim's globe that his belief in a narrow ocean had strong corroboration from information based on human experience in North American lands.

Many facsimiles have been attempted of the "Behaim Map" and the globe itself, i.e., J.G. Dopplemayer (1770), F.W. Ghillany (1853), J. Lelewel (1850 and 1857), E.F. Jomard /M. d'Avezac (1854), E.G. Ravenstein (1908), and most recently by Greaves & Thomas (of Surrey) in 1993. I have purchased a full-size facsimile from Greaves & Thomas in 2007.

Before embarking upon his journey in 1519, Ferdinand Magellan himself stated he knew that south of America there was a sound that led to the Southern Sea which Balboa had discovered in 1513 at the Isthmus of Panama: he, Magellan, had seen the sound on a map by Martin Behaim.

No one has yet determined what connection the work of the Nuremberg scholar Behaim has with Magellan's great achievement. A map by Behaim is not known. The map has either been lost or, as already assumed by Alexander von Humboldt, there was a mistake on the part of the Portuguese discoverer. Previously no doubts were entertained with respect to Magellan's statement, since it undoubtedly was well supported. Pigafetta, Magellan's fellow traveler and the chronicler of the world trip, has noted this fact. He writes: "But Hernando knew that it was the question of a very mysterious strait by which one could sail and which he had seen described on a map in the Treasury of the King of Portugal, the map having been made by an excellent man called Martin di Boemia".

Martin Behaim has accordingly been repeatedly regarded in former times as the actual discoverer of the Magellan Straits and even of the whole of America. Johann Wagenseil, a Nuremberg scholar, wrote in 1682: "(Behaim) found before Christopher Columbus the American islands and before Ferdinand Magellan the sound which bears the latter's name."

Later, in 1786, Otto, a German who then resided in the United States, described Behaim as the actual discoverer of America. Otto's arguments seemed so convincing that Benjamin Franklin had a letter that Otto had written him printed in the works of the Philosophical Society of Philadelphia.

These optimistic views have now, it may be assumed, been generally dismissed. Behaim will now hardly be recognized as the precursor of Columbus and Magellan. It cannot be proved that Behaim had under-taken any longer sea-journey to the west from Fayal (Azores) where he mostly resided from 1486 to 1507 with some intervals. He may have participated in a minor exploration trip which one Fernan Dulmo planned in 1486 and which had to have Azores as the point of departure. This trip referred however only to the discovery of new islands in the Azores waters and may not have been performed at all. Apart from this there is nothing to indicate that he had undertaken from Fayal sea trips other than those to Europe. His famous globe which he made in 1491-92 in Nuremberg does not show even the slightest trace of a knowledge of countries or islands beyond the Azores.

An outright struggle has been conducted for centuries concerning Behaim's claim to priority in the discovery of America (he himself had not the least idea of this strife). Wilhelm Postel's *Cosmography* speaks outright of *Martini Bohemi fretum* and in 1682 Wagenseil demanded that the Magellan Straits be called the *Behaim Straits*. As late as 1859 Ziegler and in 1873 the American Mytton Maury designated Behaim as America's actual discoverer. However, the skeptical criticism had also voiced their opinion. Satirical Voltaire, displaying a truly French superficiality of judgment, expressed in 1757 his disbelief in that "one (!) Martin Behem of Nuremberg" had traveled in 1460 (even though Behaim was born in 1459) "from Nuremberg to the Magellan Straits" on a mission for the Duchess of Burgundy(!). Voltaire was followed, as result of substantially more thorough

studies, by Tozen in 1761, v. Murrin 1778, Cancellieri in 1809 and others, and more recently, above all by Ghillany in 1842, v. Reichenbach in 1889 and Sigmund Gunther in 1890. Finally, in 1939 the problem was definitively clarified as regards the connection between America's discovery and the great Nuremberg scholar by answering it in the negative. The evidence which carried the greatest weight was doubtlessly the letter which on July 14<sup>th</sup>, 1493 was written to King John II of Portugal by Hieronymus Münzer who was a friend of Behaim and was in close touch with him. This letter which knew nothing about Columbus' discovery was written to suggest to King John a western trip across the ocean in order to reach East Asia. This letter would of necessity have referred to Behaim's legendary discoveries in the western ocean, if such discoveries had been made, since Behaim certainly knew about the letter and approved of it. However, it does not contain a single word that could serve as a proof of such knowledge. This must necessarily eliminate Behaim once and for all as the discoverer of America.

This certainly does not do away with Magellan's peculiar statement that he already had seen on a map the straits that he set out to sail along. Behaim's name has doubtlessly been brought in connection with this map by mistake. However, it is altogether possible that Magellan had come across a map with the entry in question, as such maps have actually existed!

Magellan's conduct before his departure is depicted in greater detail in 1601 by the Spanish chronicler Herrera who, as Humboldt supposed, could use the notes made by Andrea de San Martin, the astronomer of the Magellan expedition. The following took place according to Herrera: "(When Magellan) appeared for the first time at the Spanish court in Valladolid, he showed the Bishop of Burgos a painted globe on which he had traced his planned route. He had on purpose left the straits white in order not to give a clue to his secret. When the King's Ministers assailed him with questions, he confided to the Ministers that he planned to land first on the promontory of St. Maria, i.e. at the La Plata mouth, and then to sail along the coast until he found a sound. He was all the more sure to find a sound as he had seen it on a sea map made by Martin de Bohemia..."

This report can certainly be assumed to be true, with the exception of Behaim's authorship.

As early as 1508, i.e. 12 years prior to Magellan's discovery, there was printed a pamphlet which spoke of the circumnavigability in the south of the newly discovered south American country. A text by Johannes Schöner of Nuremberg speaks in 1513 with even greater precision. It states *inter alia* with respect to the Land of Brazil: "The Portuguese have circumnavigated this land and they have found a sound which practically tallies with that of our continent of Europe (where we live). The sound is hidden between the Eastern and the Western Sea. At a distance of about 60 miles from the promontory of this land, one has the impression of passing through the straits of Gibraltar or Sicily in the eastern direction and of seeing on the African side the Barbarian country of Mauretania."

As mentioned before, two years later the same Schöner made a globe (#328) that in a charming manner enriched the Behaim globe of 1492 with the new discoveries in the western ocean. The whole of South America - as much as was discovered of it by that time - appears on this globe under the name of *Paria sive Brasilia*, south of it the sea rises in a broad front against the continent. The supplementary text - *Magistralis* - indicates however that it is a question of straits whose length and width cannot as yet be stated.

Schöner's globe has often been confused with that of Behaim. If Magellan had ever come across it, he would, as can be understood, have believed that Behaim was its author. However Magellan certainly ignored the existence of Schöner's globe. On the other hand,



Schöner's drawings may very well be reproduced more or less exactly in other maps that took into consideration the discoveries in America. We have from 1515, the year when Schöner's globe was made, also the so-called of Leonardo-representation the countries in the west (#327). Its author is not known. Leonardo da Vinci himself is certainly not the author. He owned the map, but the master-drawer probably did not make this representation that is extremely poorly executed. Also this representation of the newly discovered South America shows a wide sound that separates America from the hypothetical southern continent of Ptolemy. Another contemporary map, designed by the Turkish mapmaker Piri Re'is in 1513 (#322) even regarded South America as a peninsula of the southern continent and therefore did not contain any separating sound. This shows that individual mapmakers used their imagination arbitrarily in their efforts to combine cartographically the new countries of which only fragments were known. Leonardo's map conceived all the new western countries as islands: the islands and coasts of the mainland which were discovered by Columbus, Labrador-Newfoundland in the north, found by Cabot, and the coast line of North America, cursorily explored by Cabral, Verrazano and others. How arbitrary were the designs of the drawers of these earliest maps of America is shown inter alia by the Ruysch map of 1508 (#313) which had inserted a connecting water way even between Honduras and Yucatan or also the much-discussed *Anian Strait* in northern America which were sought even late as the beginning of the 19<sup>th</sup> century.

The definite assertions in the pamphlet of 1508, of Johann Schöner and others, that at their time the Portuguese had already discovered a sound south of America were certainly bona fide but are nevertheless incredible. Many claimed to have found the sound only to realize their error as a new claim was made. Even the deeply indented gulf of San Matias on 41.5° S., the bay of San Julian and the La Plata mouth were considered during a considerable period of time as straits between the oceans. The aforementioned statements referred to these discoveries only. This can be inferred with certitude from the statement made in the pamphlet of 1508 to the effect that one had found America's southern cape south of the 40° S. The Magellan Straits are on the other hand on 52° and prior to Magellan had no expedition, of which we know, sighted land near there.

That Magellan's "advance knowledge" of the straits which he was to discover was doubtful is also indicated by a notice made by Pigafetta to the effect that in the austral winter of 1520 the explorer wintered with his crew on the coast on 49° 8' S. latitude and that next summer he would seek the straits even if he had to sail as far as 75°! It can be inferred that Magellan had no clear idea on which latitude the longed for sea route was to be found. Only the thesis that it could and must be found, was a kind of dogma for him. Incidentally he had the good luck that his hopes were realized. It must however be stressed that the discovered straits had not the slightest resemblance to the hypothetical straits of the earlier maps: these spoke of a wide water lane, similar to that of Gibraltar where the opposite shore could just be discerned; the actual straits are, as is known, of the nature of fjords - they are narrow and are flanked by high banks on either side.

Thus one can today describe as well-established facts that the Magellan Straits are rightly called so, that prior to the Portuguese discoverer the hypotheses connected with Martin Behaim's name must be considered figments of imagination.

## Summary

The map image of the globe is primarily Ptolemaic, as an inscription on the globe itself says; on the first glance it appears as a large Ptolemaic world map drawn on a sphere. This is in particular the case for the depiction of Europe, North Africa, the Near East and

Asia, which is far too much extended to the east. In its western and northern parts it had been completed by results of recent experience, and in the cartographically still untapped Far East by literary resources. The space between the western coast of Europe and the eastern coast of Asia is full of fanciful islands from medieval tradition, such as *Antilia* and *St. Brendan's Island*. In view of the extent of Portuguese exploration, the map is surprisingly inaccurate and partially out of date, especially in relation to the west coast of Africa. There are several hints to Portuguese expeditions along the African coast — in one case there is also a claim of Martin Behaim's actual participation — where captured coast locations are marked by Portuguese flags, and the sea route to India appears obvious. Nevertheless, it is remarkable that no notice is taken of the recently discovered islands far to the west of the Atlantic ocean. The so-called Columbus letter had been printed 1493 in Barcelona for the first time, so it must have been known, but underestimated in Nuremberg, a European trade capital with excellent communication links.

Its diameter measures 53 cm. The globe is pasted over with vellum, and the configurations exhibit flags, figures of kings, and inscriptions, in gold and colors. It is mounted on an iron stand, with brass meridian and horizon, on the edge of which is inscribed the date *Anno Domini 1510 die 5 Novembris*, which refers to these two metallic additions. There are numerous legends, in old German language, which have been reproduced by De Murr, at a time when they were yet perfectly legible; although the vellum had already turned nearly black. Parts of these are omitted or imperfectly rendered in Ghillany's facsimile of the western hemisphere. The globe was repaired in 1825, and it is after having 'been thus put in order, that Jomard obtained in 1847 from Baron Frederic Carl von Behaim "*senior familiee*," that it should be temporarily removed from that gentleman's mansion to the School of Arts of Nuremberg, to be facsimiled entirely at the expense of the French government, for the Geographical Department of the Paris National Library. That facsimile is now on exhibition in the latter place, but very difficult to decipher, on account of the fading away of the coloring. As to the original globe, it is still preserved in the Germanisches National Museum, Nuremberg.

The following legend, which is inscribed in German on the globe, gives the history of that important geographical monument:

At the request of the wise and venerable magistrates of the noble imperial city of Nuremberg, who govern it at .present, viz.: Gabriel Nutzel, P. Volkamer, and Nicholas Groland, this globe was devised and executed, according to the discoveries and indications of the Knight Martin Behaim, who is well versed in the art of Cosmography, and has navigated around one' third of the earth. The whole was borrowed with great care from th~ works of Ptolemy, Pliny, Strabo, and' Marco Polo, and brought together, both lands and seas, according to their configuration . and position, in conformity with the order given by the aforesaid magistrates to George Holzschuer, who participated in the making of this globe, in 1492. It was left by the said gentleman, Martin Behaim, to the city of Nuremberg, as a recollection and homage on his part, before returning to meet his wife [Johanna de Macedo, daughter of Job de Huerter, whom he married in 1486], who Jives in an island [at Fayal] seven hundred leagues from this place, and where he has his home, and intends to end his days.

One interpretation of the above quotation is that Martin Behaim furnished the geographical data and legends, but that the globe was constructed, painted, and inscribed by a gentleman of the name of George Holzschuer.

The globe is luxuriously decorated. It contains more than 2,000 place names, 100 pictorial illustrations, plus over 60 banners and coats of arms and more than 50 long inscriptions, many of which are only partially recognizable and have even been

overwritten. Most of the pictorial and text elements conform to the tradition of encyclopedic medieval *mappae mundi*, dealing with the Christian salvific history, with tales from antiquity such as the story of Alexander the Great, with peculiarities and fabulous monsters of foreign countries, their inhabitants, plants and animals. Many inscriptions talk in particular about overseas trade, explorations and famous travels, referring to reports like that of Marco Polo and Mandeville, and quoting classical geographic texts by Strabo, Plinius and Ptolemy, and Isidore of Seville's encyclopedia.

There is also the influence of medieval *mappae mundi*, which is exhibited by the globe's encyclopedic character with many long explanatory inscriptions, but also in numerous miniatures. But in addition to Christian themes and those of classical antiquity shown on those maps we find an increasing number of secular subjects. There are biblical themes such as the evangelists and Noah's ark on Mount Ararat, but also Alexander's military expedition, many animals on land and sea, trading ships and an ice bear hunter with bow and arrow. The majority of the long inscriptions have secular content as well: texts referring to the globe itself, literary sources on geography and science, travel reports, and Behaim's own African journey. Most of them are close to Africa and Asia and report of peculiar properties of foreign countries, their climate, the inhabitants with their habits, their nutrition and their religions, but also of monsters and anthropophages, and any important information for travelers and merchants – about animals, plants, spices and other merchandise like furs, ivory, gold and precious stones. A extended text describes long distance trade between Asia and Europe with ten intermediate stops and all who make profit. Travelling times and places with specific geographic features such as the magnetic islands are pointed out. The legendary king Prester John who was supposed to be an ally in the East against Islamic countries, is mentioned several times.

Upon completing the globe, Behaim returned to Portugal in 1498 where he served as emissary to Belgium and the Netherlands. The English captured him and brought him to England, but he escaped from the island and made it to Lisbon, where he died in 1507.

It is easy to critique the Behaim globe as false or as ill-informed. However, such a view does not take into account that Behaim used the most reliable resources available to him at the time. In the late fifteenth century, this would have been one of the best-possible approximations of the globe as it was understood according to Ptolemy's works and recent exploration. It is an insightful example of the world Columbus thought he was sailing into, as opposed to the world he found.

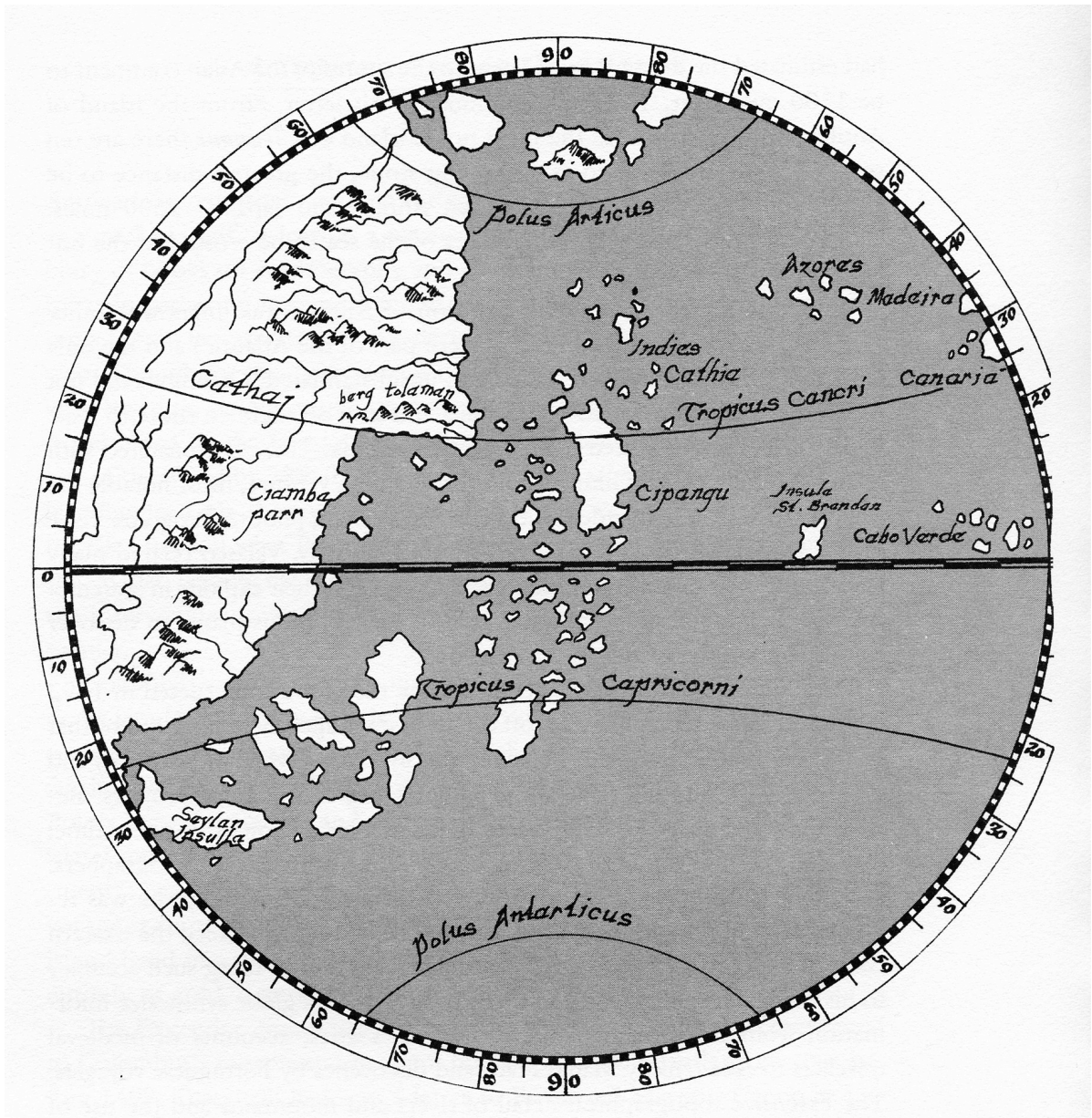
**LOCATION:** Germanisches Nationalmuseum, Nuremberg

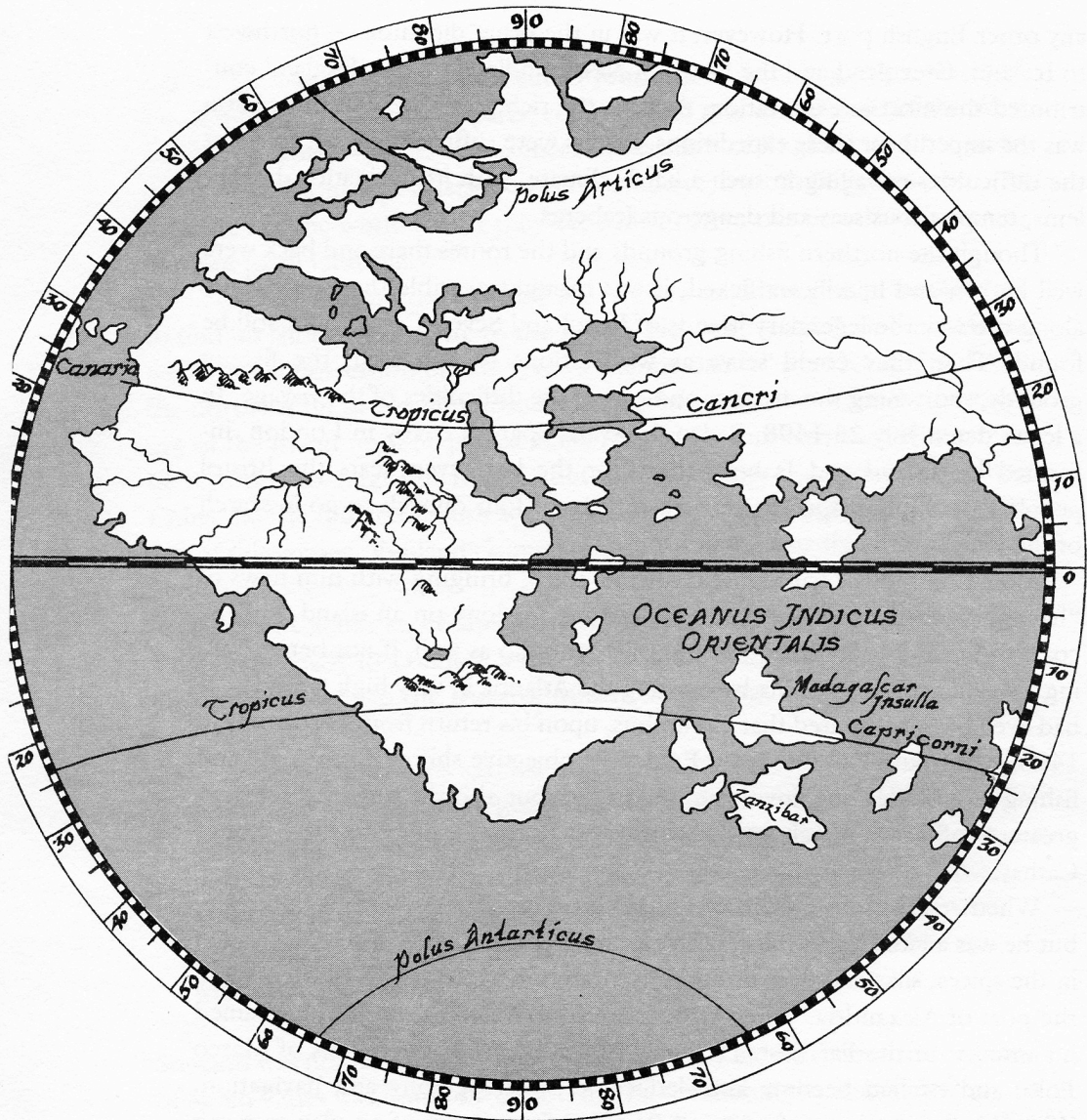
## REFERENCES:

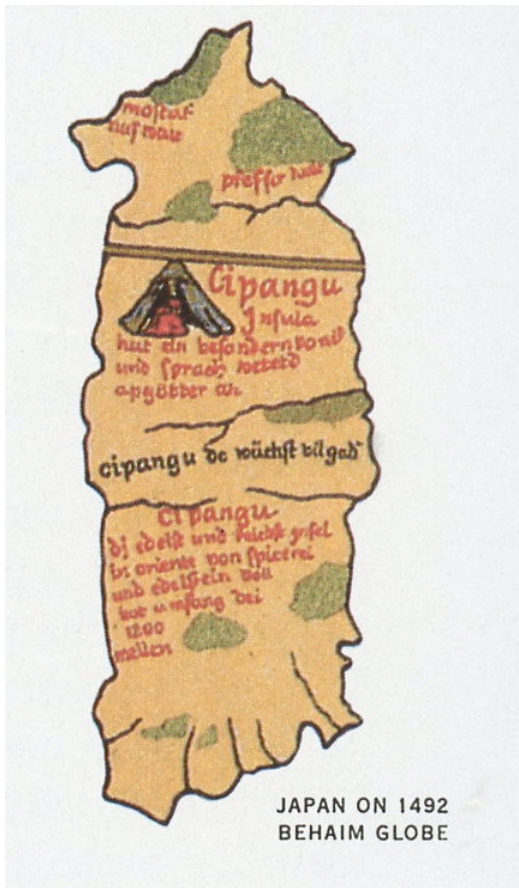
- \*Bagrow, L., *History of Cartography*, pp. 106-107, Plate LV.
- Breusing, *Zur Geschichte der Geographie, Regiomontanus, Martin Behaim und der Jacobstab*, Zeitsch. der Gesellsch. F. Erdk. zu Berlin 1869 8vo.
- \*Bricker, C., *Landmarks of Mapmaking*, pp. 28, 61, 77, 115, 152, 192.
- Brown, L., *The Story of Maps*, pp. 98, 155, 183, 200.
- Crone, G.R., *Maps and their Makers*, pp. 61-63, 76.
- De Murr, *Diplomatische Geschichte des Portug. berühmten Ritters Martin Behaims*, Nurnberg, 1779, 8vo.; and in French by Jansen, Paris and Strasburg, 1802, 8vo
- Enterline, James R., *Erikson, Eskimos and Columbus*, pp. 59-60, 212-214.
- George, W., *Animals and Maps*, pp. 46-48, 109.
- Ghillany, *Geschichte des Seefahrers Ritter Martin Behaim*; Nurenberg 1853, 4to.
- Goerz, Guenther and Martin Scholz, "Semantic annotation for medieval cartography: The example of the Behaim Globe of 1492", *e-Perimetron*, Vol. 8, No. 1, 2013, pp. 8-20.

- \*Görz, Günther and Norbert Holst, "The Digital Behaim Globe (1492)", 20 pp.
- Harley, J.B, *The History of Cartography*, Volume I, pp. 8, 316, 413, 414.
- Harrisse, Henry, *Discovery of North America*, pp. 391-399
- Harvey, P.D.A., *Medieval Maps*, p. 69.
- Hennig, Richard, "The Representation on Maps of the Magalhaes Straits before Their Discovery", *Imago Mundi*, Vol. 5 (1948), pp. 32-37.
- Humboldt, *Examen Critique de l'Histoire de la Geographie du Nouveau Continent et des progres de l'astronomie nautique dans les XVe et XVIe siecles*, volume 1, pp. 257- 274.
- Lelewel, *Epilogue de la Geographie du Moyen Age*, Bruxelles 1857 pp. 184-191.
- Maury, Mytton, "On Martin Behaim's Globe, and His Influence upon Geographical Science", *Journal of the American Geographical Society of New York*, Vol. 4 (1873), pp. 432-452.
- Menna, F., "High Resolution 3-D Modeling of the Behaim Globe", *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, Volume XXXIX-B5, 2012, pp. 115-120.
- \*Nebenzahl, K., *Atlas of Columbus*, pp. 15-17, Plates 5a/5b.
- \*Nordenskiöld, A.E., *Facsimile Atlas*, pp. 21, 64-65, 72, 73, 100-101.
- \*Ravenstein, E. G., *Martin Behaim his life and his globe*.
- Skelton, R.A., *The Vinland Map and the Tartar Relation*, pp. 155, 175, 179, 234.
- \*Stevenson, E.L., *Terrestrial and Celestial Globes*, pp. 42-57, Figure 23.
- Winsor, J., *Narrative and Critical History of America*, p. 104.
- Tooley, R., *Maps and Mapmakers*, pp. 24-25, 96.

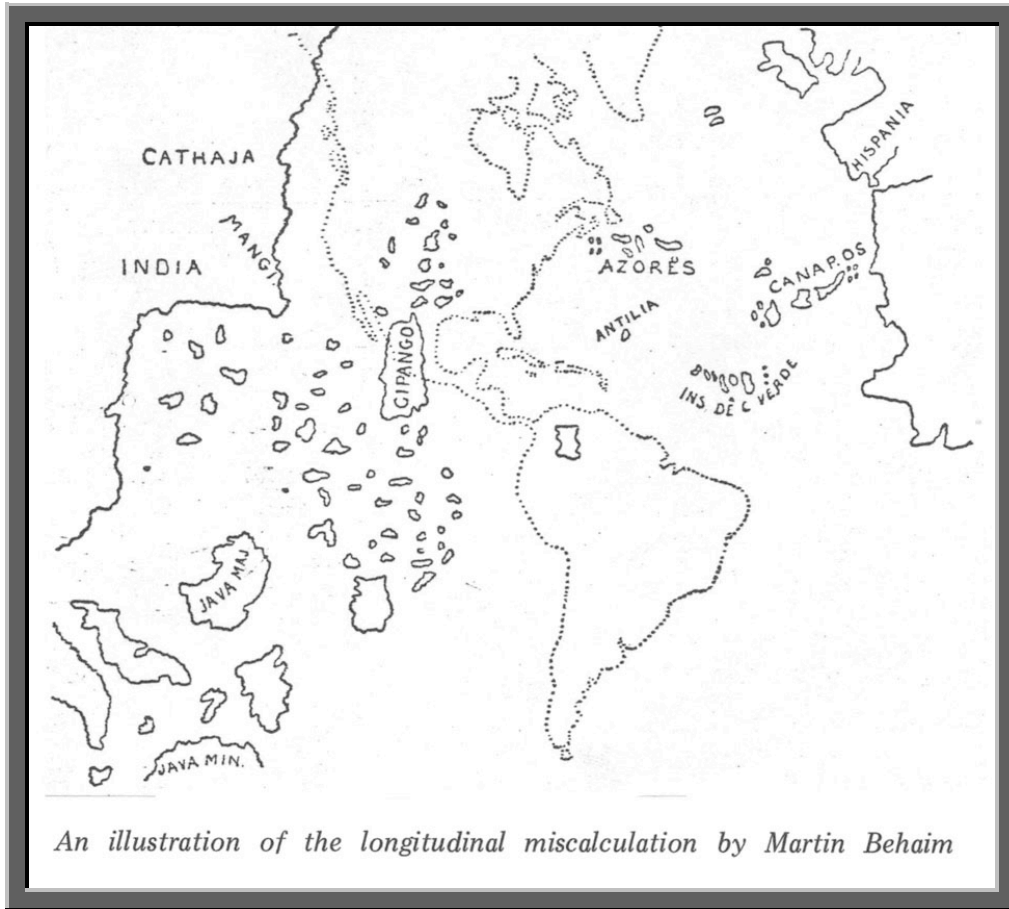
\*illustrated









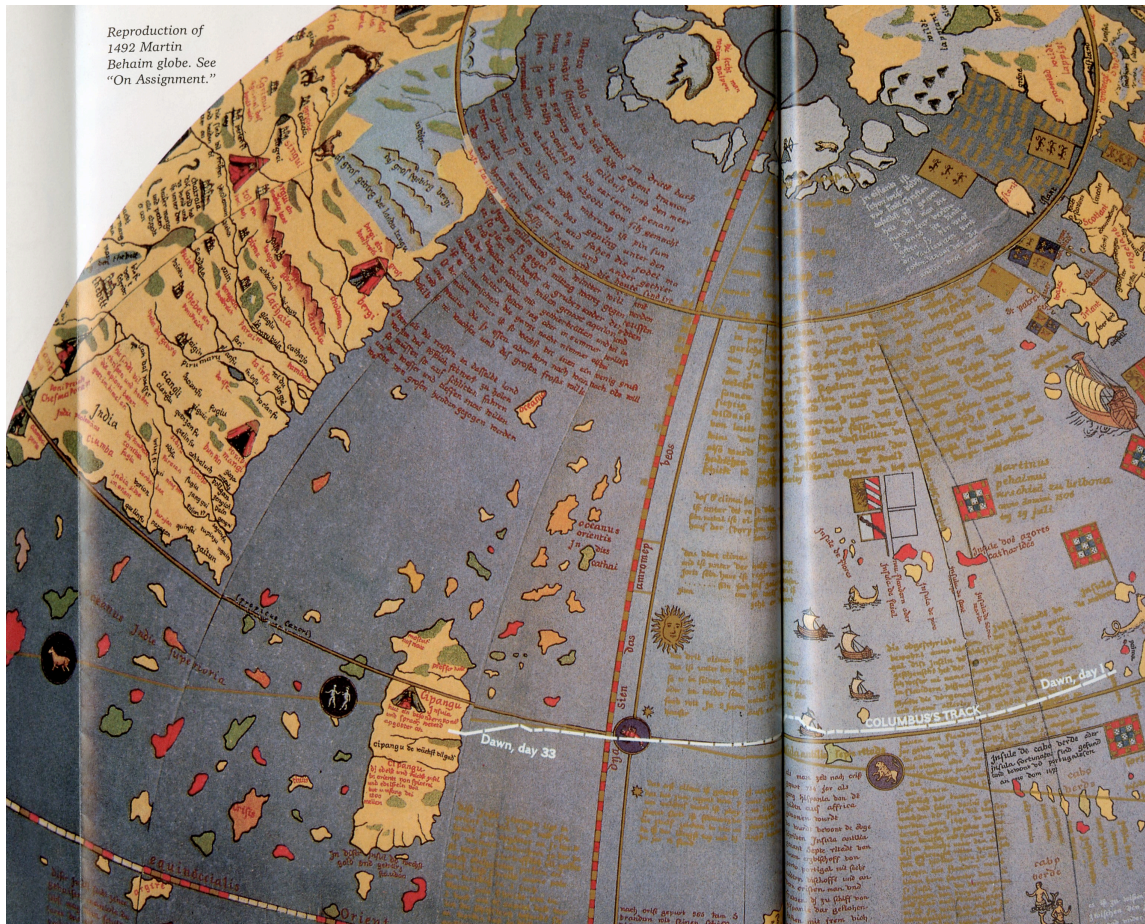






Detail of the Atlantic Ocean, Zipangu [Japan] on the left, real and mythical islands such as Brasil, Antilia and St. Brendan's island center and right



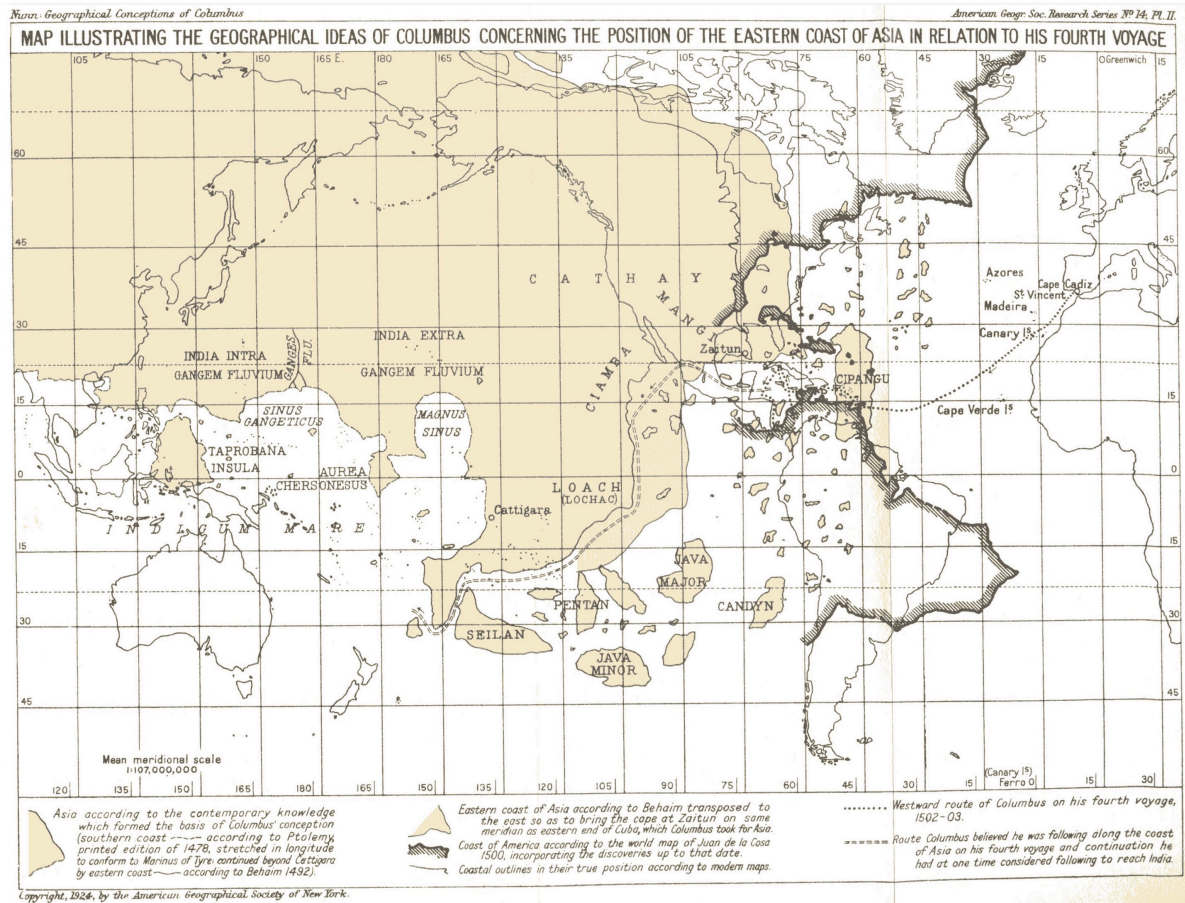


Columbus' 33-day initial route plotted on a facsimile of Behaim's globe, resulting in his perception that he landed near Cipangu [Japan]

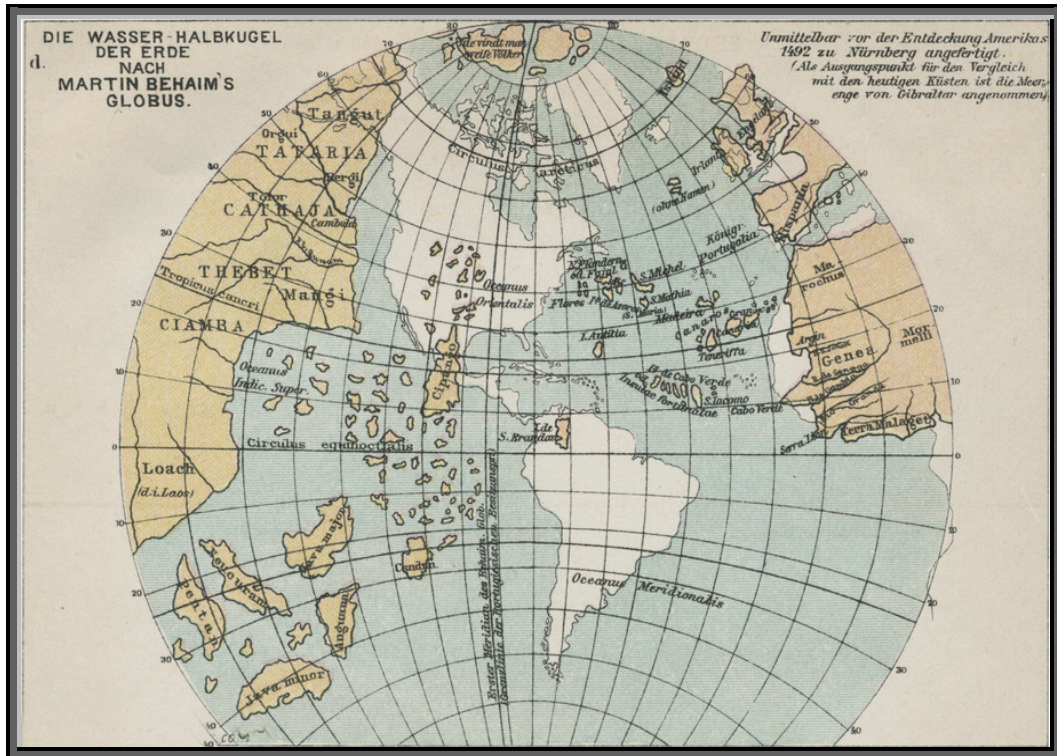


*Detail: Europe (facsimile)*





*Behaim's Globe superimposed on a modern Mercator projection*





*Facsimile Behaim Globe showing the "Tiger Leg" in S.E. Asia by Greaves & Thomas*





*Facsimile Behaim Globe showing the Indian Ocean and the "Tiger Leg" in S.E. Asia  
by Greaves & Thomas*



*The South Pole, obviously Behaim was not willing to speculate on the Southern Continent*





*Cipangu [Japan] on the facsimile globe produced by Greaves & Thomas (author's copy)*



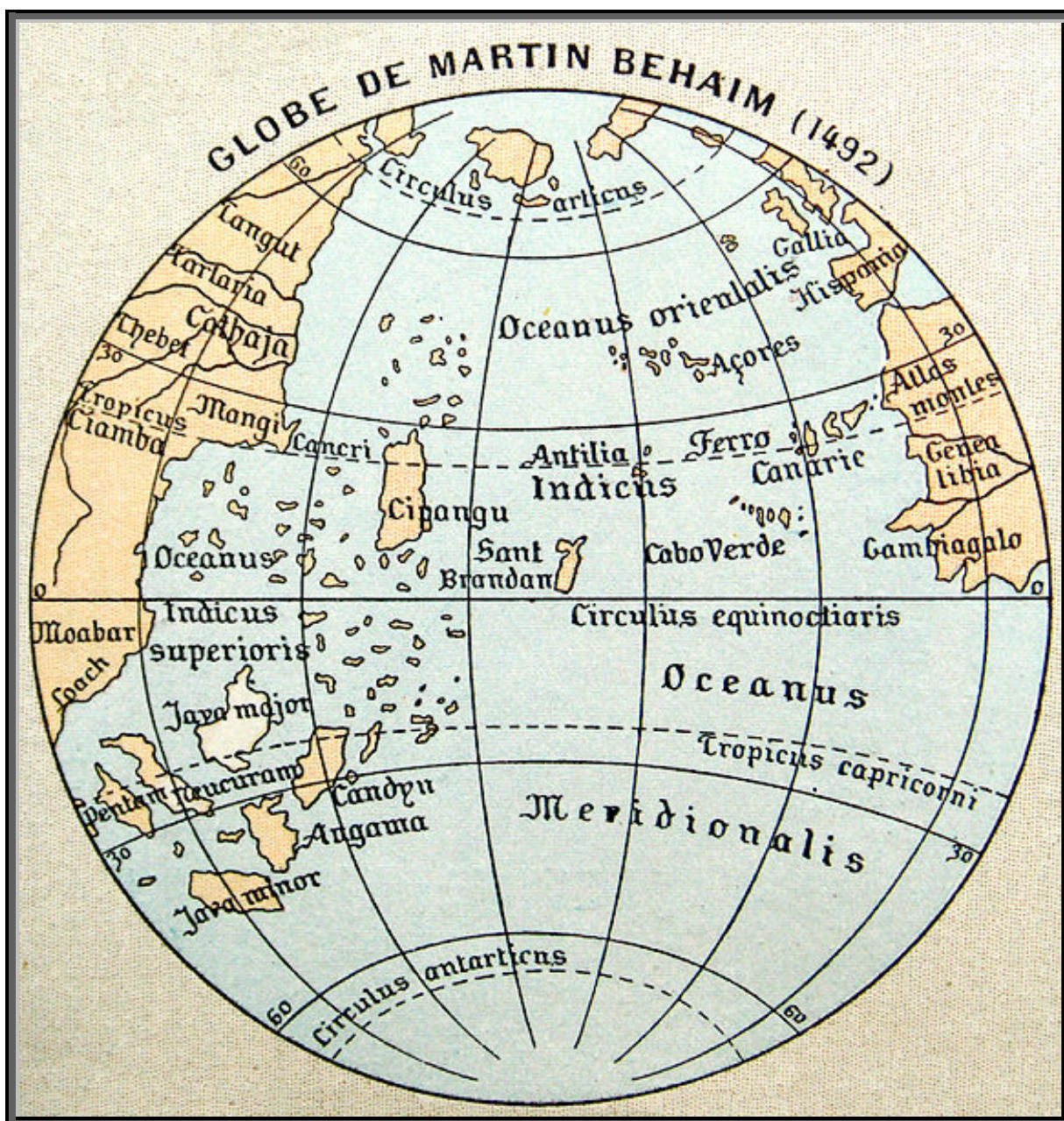
*The Indian Ocean on the facsimile globe produced by Greaves & Thomas (author's copy)*





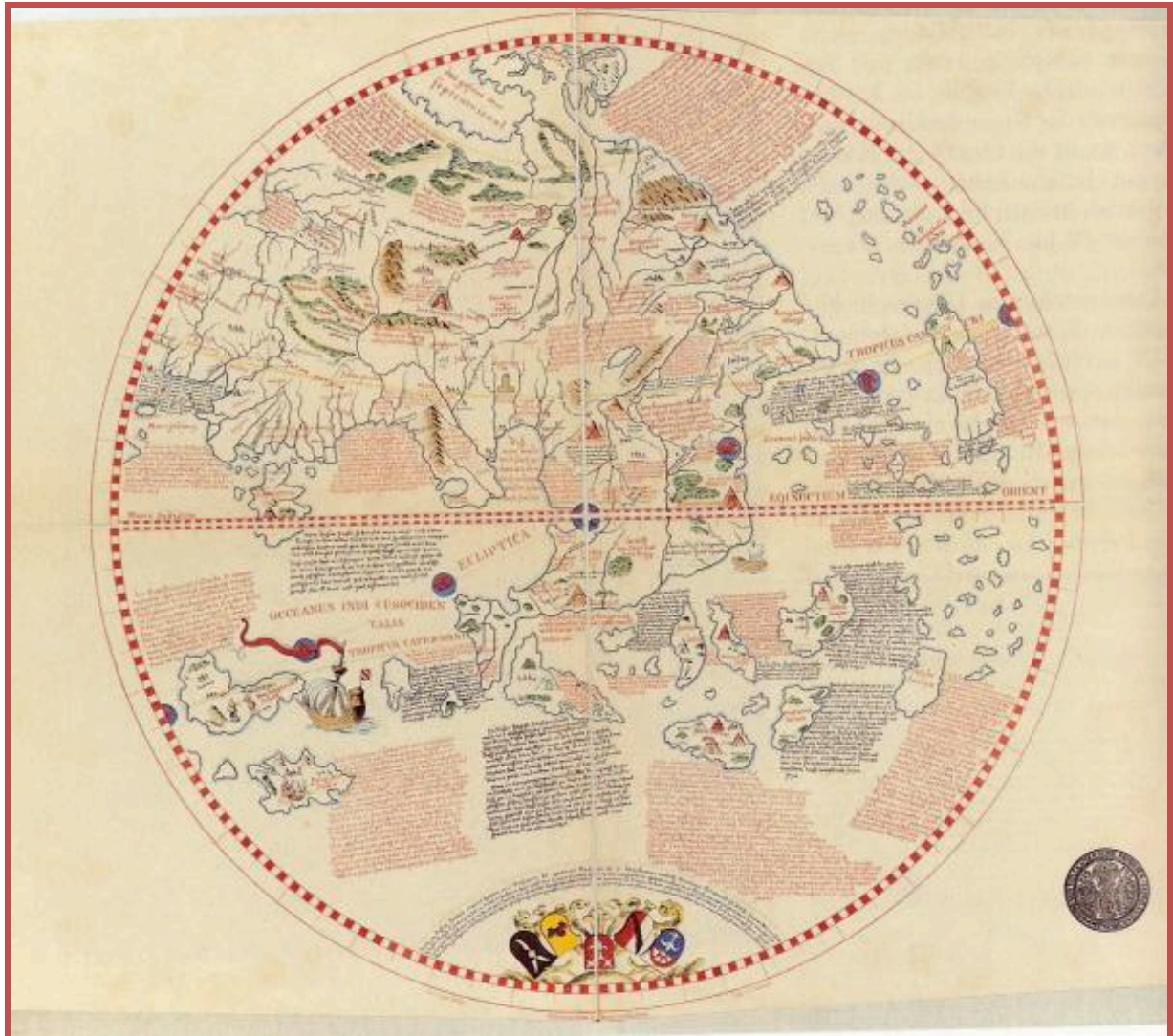
*Africa on the facsimile globe produced by Greaves & Thomas (author's copy)*



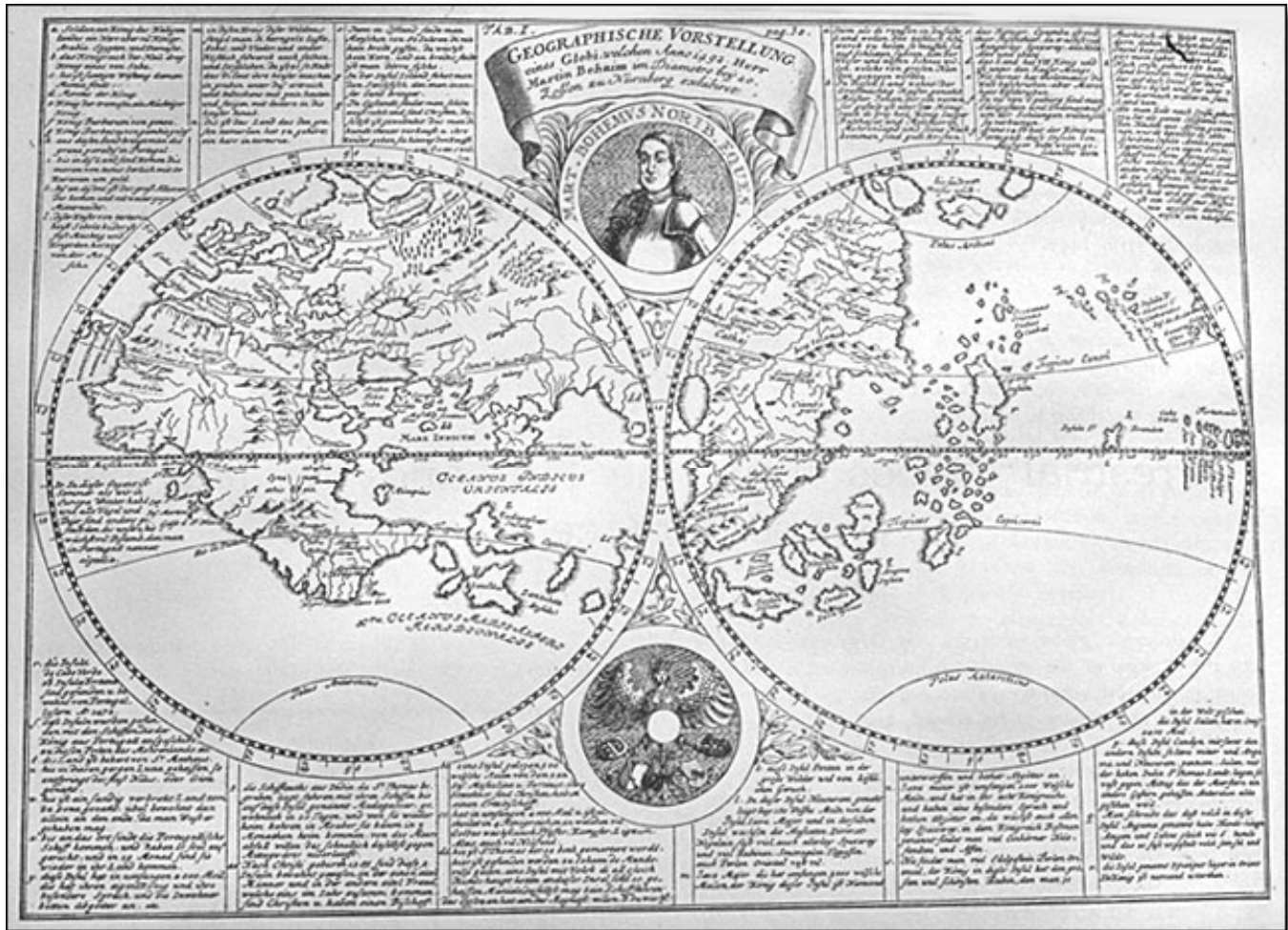












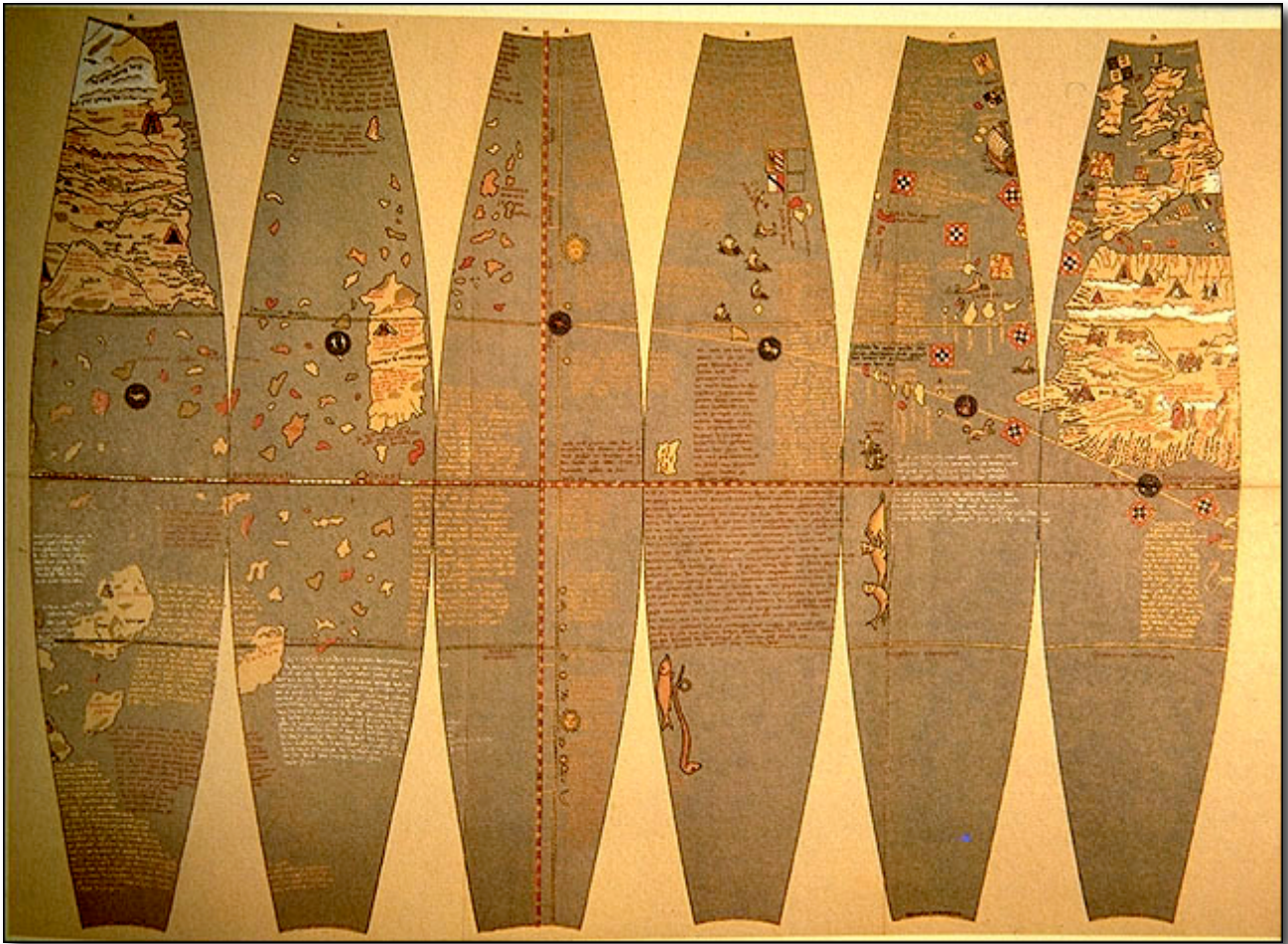
Ravenstein's Behaim Globe illustration



Facsimile Globe Gores by E.G. Ravenstein: Africa

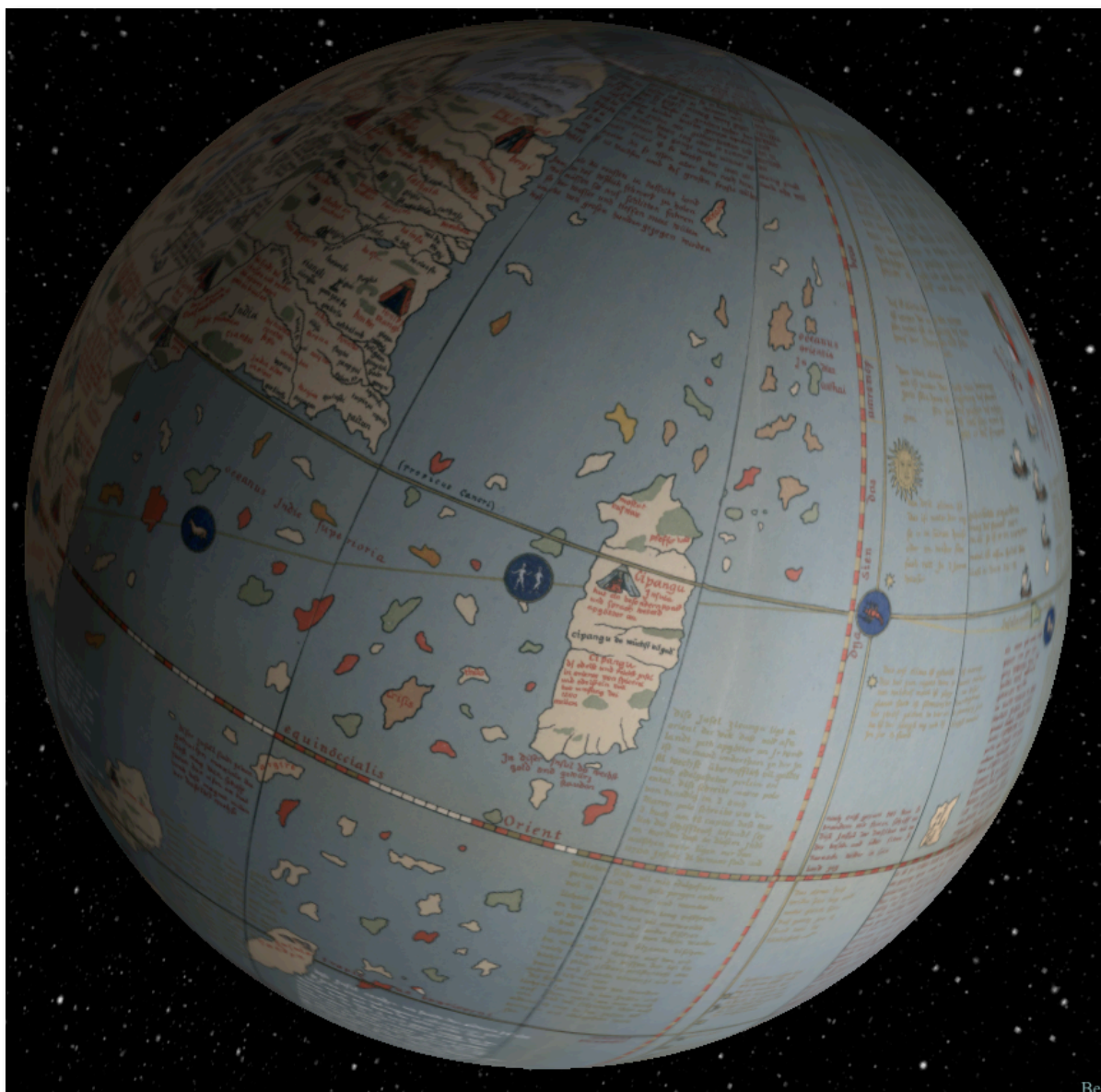






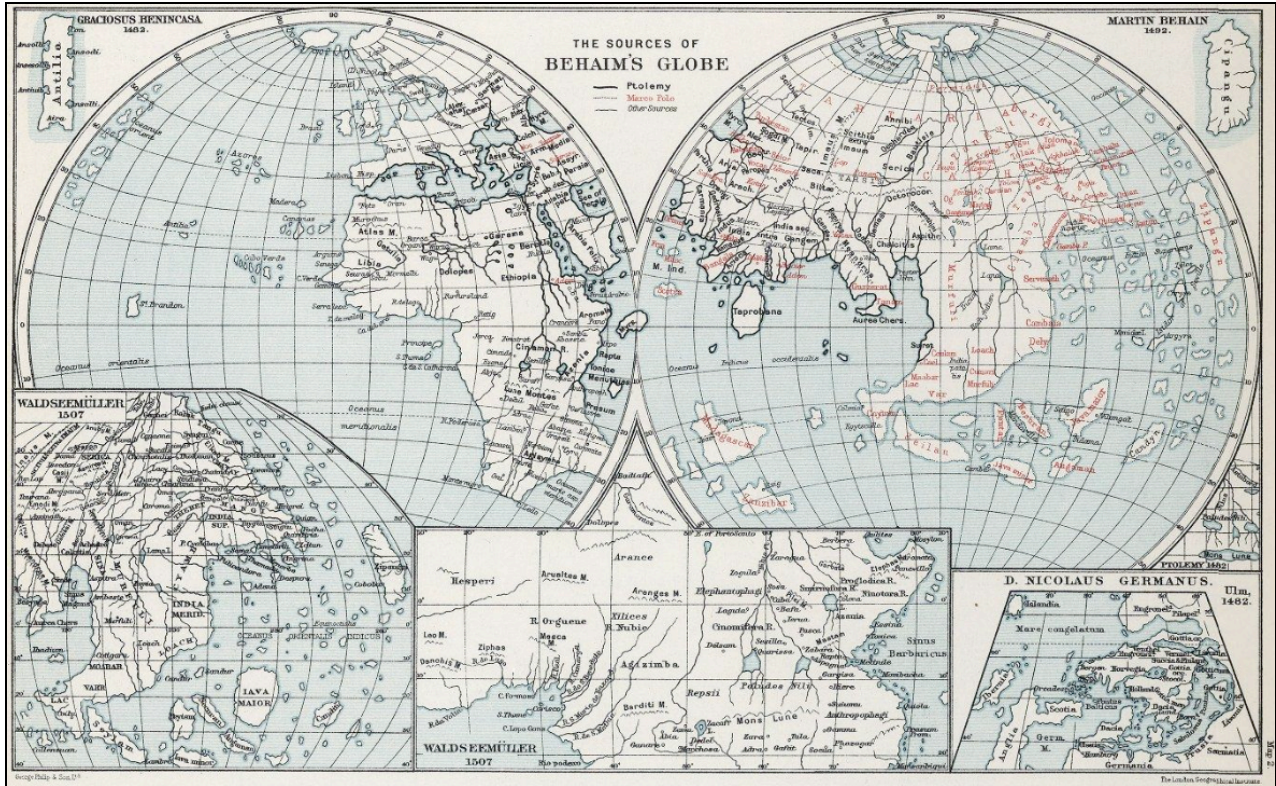
*Facsimile Globe Gores by E.G. Ravenstein*



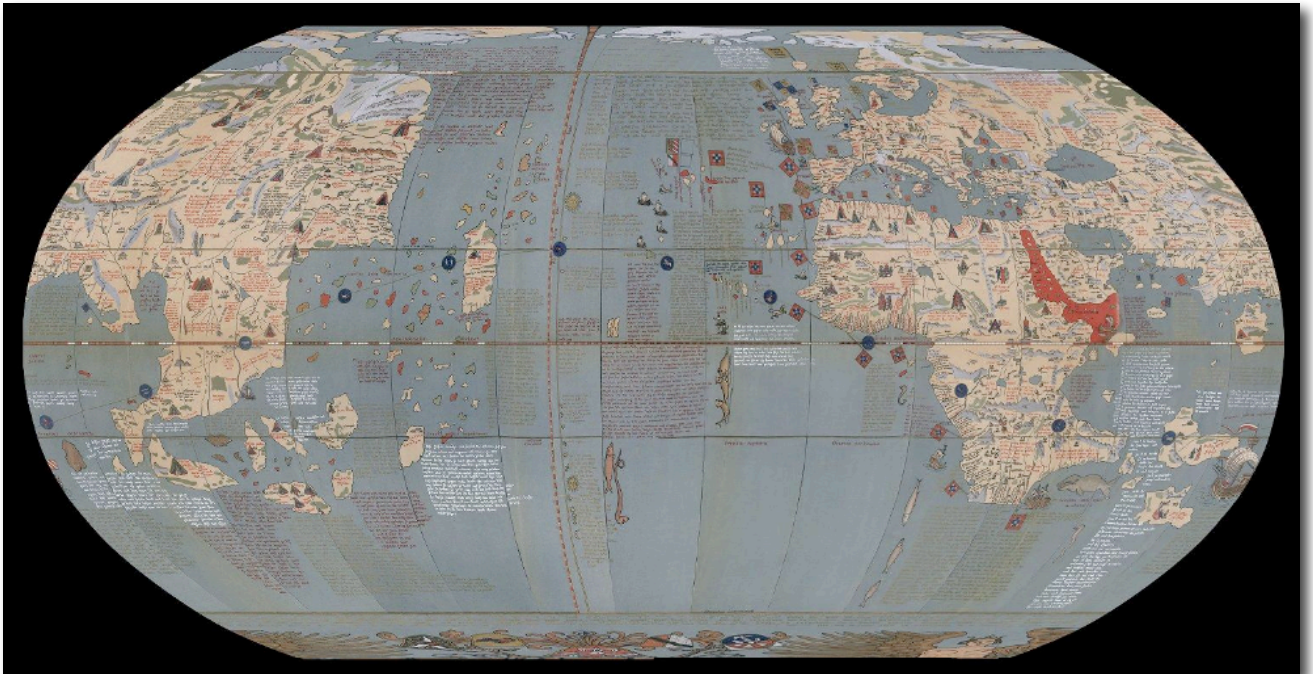




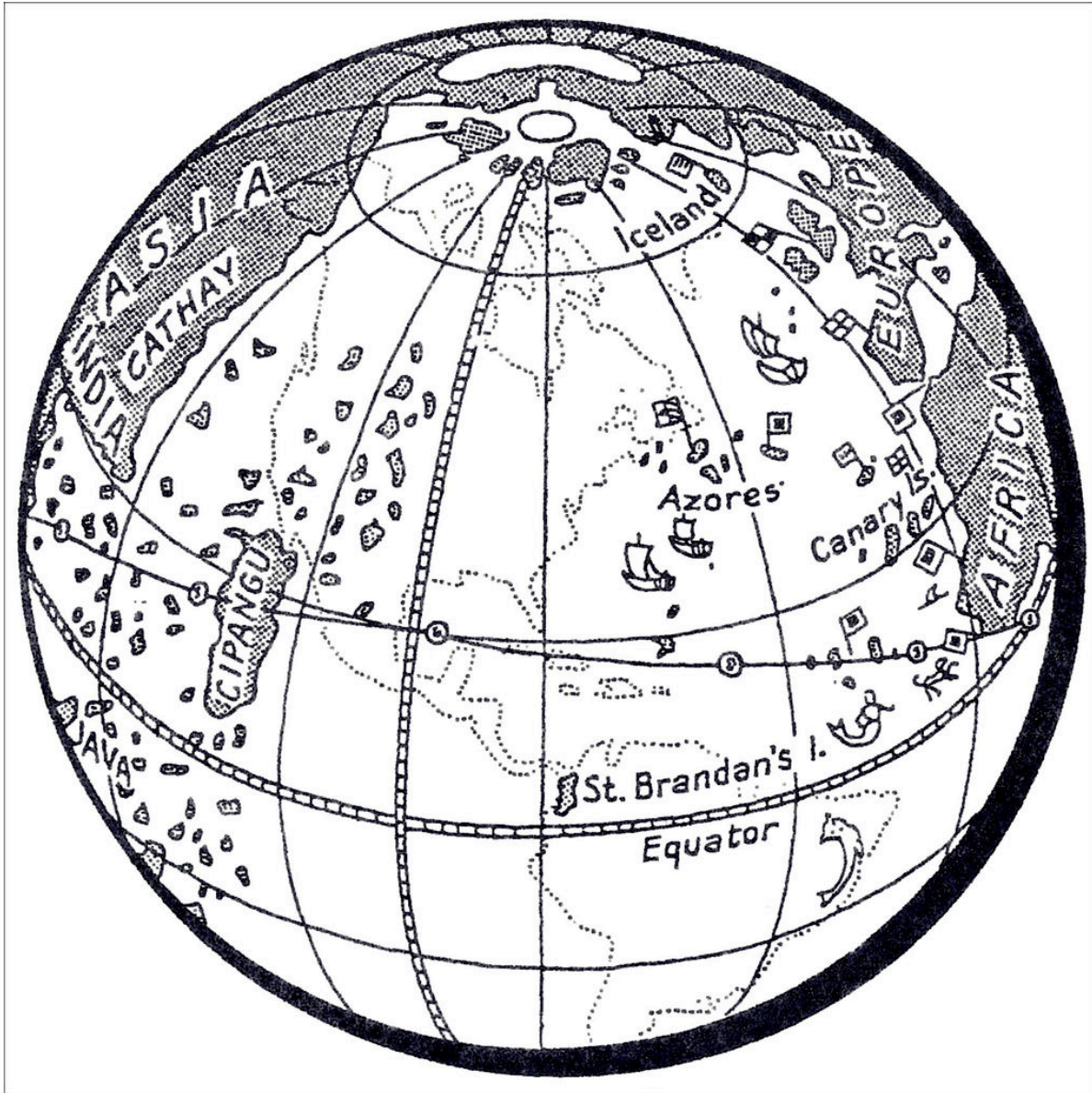




Sources used by Behaim: *Ptolemy*, *Marco Polo*, *Other*











*Facsimile produced by Dr. D. W. Larson, Emeritus Professor  
University of Guelph, Guelph, Ontario, Canada*

