



This volume continues to show that there were clear differences in the character of Western medieval world maps, depending on the sub-period in which they were created, and the continued progress that was being made in Asian cartography. It is thus not possible to generalize accurately for the *mappaemundi* of this thousand-year period variously referred to as the “Medieval Period”, the “Middle Ages”, or even the “Dark Ages”. In what David Woodward calls the *Patristic* period, from about A.D. 400 to 700, three basic cartographic traditions - the *Macrobian*, *Orosian*, and *Isidorian* - were established, and these do recur throughout the entire medieval period. In the second period, from about 700 to 1100, in which a larger sample of *mappaemundi* first appears, little innovation is seen in Europe except in the maps of Beatus (#207), despite the renewed interest in natural science; however, considerable expertise was becoming evident in Asia. It is not until the third period, from about 1100 to 1300, with the influx and translation of numerous Arabic and Greek manuscripts, especially the *Almagest* by Ptolemy (#119), that scientific interest re-awakens (for examples of maps from these two early medieval periods, see #200-#226 in these monographs). The last period, from about 1300 to 1500 and the subject of this volume, stands apart from the earlier tradition of *mappaemundi* and acts as a transitional stage between the medieval and modern worlds of mapping. The three frameworks of maps: monastic, nautical, and Ptolemaic, which had for a while each enjoyed a separate and parallel development in Europe, came together in the 15th century and set the stage for the technical advances of the European Renaissance.

The imagined break between the medieval and early modern periods that has for so long been located in the year 1492 (*Atlantic perspective*) or 1500 (*textbook periodization*) or 1517 (*dawn of the [Protestant] modern world*) is as misleading for the history of cartography as for that of culture, religion or politics. Marcel Destombes’ monumental book *Mappemondes A.D. 1200-1500* gave up rather arbitrarily at the latter date, though quite “modern” maps (e.g., the Ptolemaic maps of the later 15th century) appeared well before 1500 and some largely “medieval” maps (including many topographically more accurate maps that continued the *orientalizing* and apocalyptic ethnography of previous centuries) were made after that date. The period of transition from *mappaemundi* to empirical cartography, the era of the so-called cosmographic maps, is at the center of this chapter of my old maps. However, continuities are as important as change. Continuity is not the context or background against which putatively ‘modernizing’ change takes place. It is the “walking bass” of pre-modern cultural history and as such, a powerful determinant in the dynamic that pits ‘empirical evidence’ against tradition, experiment against authority. Once again one must keep in mind that maps should be evaluated based upon the intent and purpose of the mapmaker, not whether it exhibits scientific “progress”.

As Angelo Cattaneo states in his article “European Medieval and Renaissance Cosmography: A Story of Multiple Voices” (*Asian Review of World Histories* 4:1 (January 2016), 35-81), late medieval and early modern world maps of the non-Ptolemaic variety, especially the cosmographic sort, were heavily indebted to their immediate [early] medieval predecessors and

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models. This is especially true of lesser-known areas that usually appeared at map margins, where the cartographer re-inscribed, consciously or not, and usually without much critical reflection, that which tradition declared must be there. Angelo Cattaneo states that “Cosmography” is the representation of the *imago mundi*, which is the description of the earth within the universe, in written and illustrated form in the late Middle Ages and the early modern era. Cosmography rested on a vast compilation of knowledge deriving from heterogeneous sources. It was based on a tradition that harked back to classical antiquity and remained authoritative throughout the Middle Ages. It found an expression in historical and geographical treatises, as well as in encyclopedias and maps of the world. Comprised of elements of Christian cosmology, notably the location of the earth within the context of the story of Creation, it was meticulously represented, for example, in a fresco by Giusto de’ Menabuoi (c. 1330– c. 1390) at the Baptistry of the Duomo of Padua (c. 1378). Alongside these Christian components were elements of astronomy and Ptolemaic astrology, namely the position of the earth in relation to the celestial world of the planets and the stars, along with the influence of Aristotelian natural philosophy that discussed both the relative position and size of the earth in relation to the other Aristotelian elements of water, air and fire, placed beneath the circle of the moon.



Giusto de’ Menabuoi, *The creation of the World*, fresco, 1376. Padua (Italy), Baptistry of the Duomo.

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Medieval cosmography was the culmination of a cultural synthesis uniting Christian cosmology, Aristotelian natural philosophy of scholastic origins, Latin and Greek classical author, chiefly from the 15th century onwards, Ptolemy, and accounts of the voyages undertaken by more recent writers such as the missionaries who traveled to Asia in the 13th and 14th centuries. The latter included the Franciscans John Piano of Carpini (c. 1182-1252), William of Rubruck (c. 1220 – c. 1293), Odoric of Pordenone (c. 1265-1331), John of Montecorvino (1247-1328), John of Marignola, and Jordanus Catalanus. Another major influence was that of merchant travelers, from Marco Polo and Niccolò de' Conti to the more numerous protagonists of European expansion. To these were added reports about pilgrimages to the Holy Land, and geographic treatises of medieval compilers such as the 13th century Ristoro d'Arezzo, Marino Sanudo the Elder (c. 1260-1343), Friar Paolino Veneto (c. 1270-1344), Fazio degli Uberti (died c. 1370) as well as the cardinals Pierre d'Ailly (1350-1420) and Guillaume Fillastre (1428).

From the close of the 13th century onwards was the knowledge transmitted orally by travelers, monks and merchants, diplomats, ships' captains, whose reports often remained anonymous, and which were compared with ancient and more recent written sources. Prior to the 13th century western Christians had only the haziest impressions of what lay beyond the principalities of European Russia and the crusading grounds of the Middle East. Vague and fanciful notions permeated their perception of Asia, among them the domain of Prester John, a mighty prince who ruled a Christian kingdom somewhere deep in the interior. Curiously, it was the rise of the Mongol empire that finally brought East and West together, wreaking havoc in eastern Europe but thereafter providing the political stability, the *Pax Mongolica*, that would allow a traveler to pass unhindered from Christendom to China. Taking advantage of this, and with an arrogance and presumption that defies comprehension, the pope decided that the 'Great Khan' of the Mongols could be ideal material for recruitment into the Christian fold. Sadly, what he had not anticipated was that the appearance of an emissary before the khan would automatically be taken as a gesture of submission and allegiance, not only by the emissary but also the potentate he represented.

The first mission to the Mongols started from the papal residence at Lyon in 1245, led by the Franciscan friar Giovanni da Pian del Carpin. However, when he and his Polish companion arrived a year later on the River Volga at the camp of Batu, commander of the Mongol western front, they were told that to accomplish their mission they would need to continue on horseback to the court of the supreme khan, a mere 5,000 kilometers [3,000 miles] to the east. After 106 days in the saddle they finally encountered the khan Guyuk at his camp near the Mongolese capital of Karakorum. Not surprisingly, the khan was in no mood to accept Christianity, and in November 1246 he sent the travelers on their way with an imperious and self-asserting reply for the pope. Seven years later, Louis IX of France dispatched Friar William of Rubruck on what the king regarded as a fact-finding and diplomatic mission, but what for the friar turned into a profound spiritual quest. Following a route similar to Carpin's, but in the greater comfort of ox-drawn covered wagons, William entered Karakorum on Palm Sunday 1254 and to his surprise came across craftsmen from all over Eurasia, including a goldsmith from Paris. Rubruck's detailed report, sympathetic and observant, survives in full and in certain respects remained unsurpassed

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until the 19th century.

Some twenty years later, while Marco Polo enjoyed the hospitality of Kublai Khan in China, a Chinese Christian, Rabban Bar Sauma, was setting out on a protracted and circuitous ten-year journey to the West. The monk, a cleric of the Nestorian church which had studded the Silk Road with monasteries, headed first for Maragheh, the church's cultural home in northern Iran, which with its observatory and library of 400,000 books was the world's unsurpassed center of learning. Commissioned to cement a Mongol-Nestorian-Catholic alliance against Egypt, he eventually arrived in Rome in 1287 bearing the welcome news that the khan looked favorably on Christianity and that missionaries might flourish under his patronage. Thus began the remarkable extension of missionary activity that would last until the overthrow of the Mongol dynasty eighty years later. In 1294 the Franciscan missionary Giovanni da Montecorvino was welcomed to Beijing, built a church and subsequently became the city's first archbishop. Others, like Giovanni de Marignolli, were soon to follow, but few complete narratives of their journeys survive or have yet come to light.

Of the Franciscans travelling to China, none left a more detailed account than Odoric of Pordenone, an Italian monk who started his wanderings around 1316. From Iran he sailed to western India, spending a year with the Christian community near modern Chennai, then proceeded by junk to Sumatra, Java and China, arriving about 1322. Three years later, from the khan's capital *Cambaluc* [modern Beijing] Odoric started home by an overland route through Central Asia, Iran and Asia Minor, arriving back in Padua in 1330. Unfortunately his influential narrative, widely plagiarized by apocryphal travelers like John de Mandeville, is a miscellany of curiosities and anecdotes, entertaining but geographically vague and incoherent. In wide-eyed astonishment he marveled at the splendor of the khan's palaces; he describes Hangzhou as the 'greatest city in the whole world', and Canton (Guangzhou) as being 'as big as three Venices'. These he actually saw, but as is so common, almost expected in medieval narratives, it is often difficult to distinguish personal observation from material acquired secondhand. Odoric was the first to speak of Tibet and the unusual customs that prevailed there, but whether or not he entered Lhasa has been hotly debated. He died within a year of his return, his tomb at Udine becoming a site of devotion and pilgrimage, a place where many miracles were wrought.

Between the middle of the 14th century and the end of the 15th remarkably few European travelers succeeded in penetrating much beyond the mercantile emporia of the Levant. In 1404, Ruy Gonzalez de Clavijo, a knight sent out by Henry III of Castile on a diplomatic mission to Tamerlane, managed to reach Samarkand; and in the following years Johann Schiltberger, an obscure German mercenary, found his way by various adventures into Central Asia and the nearer parts of Siberia. However, those that chose to travel entirely in the Islamic world did so only by means of hazardous subterfuge, disguised as Arabs and adopting the outward trappings of Islam, perpetually in fear of exposure. Of these intrepid wanderers the best known and most influential was Niccolo de' Conti, a Venetian trader resident in Damascus around 1414. Fluent in Arabic and familiar with local customs, ideally qualified for travel incognito, Conti decided to take a look for himself at the routes by which spices were arriving in the Persian Gulf. His personal odyssey would occupy him for more than twenty years.

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The precise direction and chronology of Conti's travels are conjectural, but his outward route took him across the desert to Baghdad, and from Basra to the major ports of India and Ceylon/Sri Lanka. He sailed up the Ganges for three months and crossed mountains and plains to the Burmese empire, ascending the Irrawaddy to the capital Ava. Following the normal trade routes, he visited Sumatra, Java and *Champa* [Vietnam] before making his way back via India and the Red Sea to reach Cairo about 1435. Here, during a two-year wait for a passport, Conti reluctantly converted to Islam and lost two of his four children and his Indian wife to the Black Death. Returning to Venice in 1439, and soliciting absolution for renouncing his Christian faith, he sought an audience with Pope Eugenius in Florence. The timing of Conti's arrival proved salutary in the extreme, coinciding as it did with a General Council of eminent scholars, a ready audience which demanded that Conti should dictate his experiences to the pope's secretary Poggio Bracciolini, a humanist scholar of formidable learning. The result, factually precise and devoid of the usual tall stories, was widely circulated in manuscript and exerted considerable influence on geographical thought, particularly with regard to the countries bordering the Bay of Bengal.

It is noteworthy that not only cartographers such as the Majorcan Jewish Cresques at the end of the 14th century (#235), the Venetian Camaldolese Fra Mauro (died c. 1459/64, #249) and the German merchant Martin Behaim of Nuremberg (#258), who was active in Portugal during the second half of the 15th century, but also Petrus de Abano (1257-1315), a professor at the University of Padua, relied on oral testimonies. Oral testimonies increasingly served as the basis of descriptions of Northern Europe, Asia and Africa and, from the late 15th century onwards, also of the 'New Worlds'. The travelers mentioned above suggest that European travelers to Asia in the 13th and 14th century had an ambition to confirm or refute the authenticity of traditional images of human monsters and exotic animals. In doing so, they used their own observations of reality to rectify or explain many mythical motifs. Aboriginal tribes that the travelers encountered in person are never described as monsters, but rather as people of different appearance. "Real" monsters were thus restricted to the sphere of legends — not only the European ones, but also local tales, as is evident from the use of Mongolian names for monsters described by Mongols to the author of *Hystoria Tartarorum*.

These curious travelers of the 13th and 14th century set out on their journeys with certain predetermined images of the East in mind; these were based on earlier accounts by authors of antiquity, who wrote primarily about "India," as well as by the authorities of the Christian era, above all Isidore of Seville (†636, #205) and other encyclopedists. Images of the East were also widely reflected in the fine arts. During their journeys, the medieval missionaries had to confront their expectations with observations of reality, which in many cases completely differed from what they had imagined. The proportion of space these authors devoted to traditional imagery and to their personal observations, as well as the manner in which they reconciled the two, differs among the texts. The differences are based on a range of factors, including the genre and purpose of the work, the intended audience and, last but not least, potential interventions by later editors. The exact meaning of the term "India" often varies in ancient and medieval sources. It was used not only to designate the Indian subcontinent, but also parts of China, North Africa, the Arabian Peninsula or Ethiopia. Among the most important ancient authors writing about India, Ctesias of

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Knidos and Megasthenes can be mentioned.

Different perceptions and discursive traditions pertaining to the concept of space were therefore at the onset of affirming the systematic use of cartography as a means for the construction of territorial relations and their representation. By conflating the classical geography of the ancient authors with the testimonies of the moderns (sea charts, *mappae mundi*, *portolani*) from the beginning of the 13th century a process began that, by placing geography at the service of universal history and commerce, led to the affirmation of cartography as an effective medium of representing and constructing space. The European medieval travelogues to some extent reflect traditional imagery of the East and attempt to find answers to questions regarding the nature of legendary phenomena. That, however, does not mean that these authors were unable to also perceive reality around them and supplement or rectify earlier knowledge. William of Rubruck did not hesitate to dispute Isidore's earlier claim that the Caspian Sea is a sea gulf by pointing out that it is rather a sea or a large lake and that it is possible to travel all around it in four months. John of Marignola similarly did not shy away from rectifying earlier erroneous beliefs, whether they were related to the world's geography or to the way in which pepper was grown.

Traditional interpretations of medieval cosmography put forward the idea of conflicting positions between alleged 'metaphorical' and 'theological' ecclesiastical geography (which supposedly was not interested in representing the "real" world) and the accurate, practical and experience-based knowledge of merchants. The latter found its illustrative cultural expressions in marine charts and in *portolans*, that is in written texts detailing extended lists of costal place names with intervening distances and wind directions, bays, headlands, ports and harbors, river mouths.

On early-modern maps, European cartographers kept alive via classicizing images an older and parallel view of the outside world and its inhabitants. The interplay between tradition and knowledge gained by direct observation or from reliable *empirical* sources reveals the process of cultural negotiation that produced "modern" cartography; what seemed to be "sound empirical knowledge" was contingent upon, even fundamentally formed, by cultural preconceptions and moral connotations rooted in a traditional carto-ethnographic "science". Neither ornaments nor fossils, such morsels of undigested medievalia cannot be dismissed as hold-outs on the road to empirical science. They were rooted in the authorized learning of their sources and models, even though such sources were starting to be questioned. The cultural history of cartography can therefore be read and understood from maps' *margins* as well as from the 'center'.



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The later medieval European *mappaemundi* had a stronger sense of direction. Around 1200 Jerusalem began to be put in the center of world maps, and the significance of this position was well appreciated. Around the rim were found monstrous races and exotic animals, part of the wonder of creation not often seen at home. Many of these creatures were inherited from classical writers. Both the form and the content of the maps appeared to discourage exploration, by separating “uninhabitable” zones and filling them with terrifying monsters. Mapmakers pushed and pulled at the medieval world map form, trying to accommodate events and places that they saw as significant. Travels to Asia in the 13th century, which culminated in the work of Marco Polo, filled the depictions of that continent with new names and a new awareness of its geographical features and distances. Polo also contributed important information about the Indian Ocean with its islands, spices, and vibrant, lucrative trade. This information remained fairly static over the next two centuries until Europeans once again took up travel and trade in the Indian Ocean and the Far East. In the 14th century the rediscovery of the Canary Islands, followed by Madeira and the Azores, began to stretch cartographic space to the west.

Then in the mid-15th century the Portuguese voyages down the African west coast expanded the size of the known world to the south and scuttled the idea of an “impassable equatorial zone”. By the late 15th century, the old circular map form with its narrow rim of ocean did not have enough space to fit all this in, and the implication that there were parts of the world where humans could not travel, either because they were too hot or cold for human habitation or were forbidden by God, was less convincing. Enterprising travelers to the north and south reported busy human activity in the so-called “uninhabitable zones”. Although some charlatans claimed to have seen Paradise from a distance or to have heard the roar of the four rivers departing, others told of searching in vain and finding more mundane places on the alleged spot.

The 15th century mapmakers discussed in herein did what they could to retain the beloved and familiar features of their world, while making their maps as up-to-date as possible. Peter Barber calls these “hybrid” maps and points out that discriminating 16th century collectors, such as Henry VIII and Ferdinand Columbus, had examples in their libraries. Many makers of maps (*Olmütz*, *Borgia*, *Leardo*, *Catalan Modena*, *Rudimentum Novitiorum*, *Fra Mauro* and maps of the *Nova Cosmographia*), kept the traditional circular form of the world, while a few others, such as the *Genoese* map (#248), dispensed with it. Jerusalem continued to be the center for some maps, but others (*Fra Mauro* (#249), *Catalan Modena* (#246), and *Genoese* (#248)) expanded to the east and north. Paradise continued to appear on most maps in the east with its four rivers. The original explanation, other than biblical authority, was that the sources of these great rivers were unknown, but in the 15th century we find Florentine humanists questioning Ethiopian monks about the real source of the Nile. The influx of new classical works (such as those by Ptolemy, Pomponius Mela, and Strabo) and the critical reading of these in connection with the preexisting library staples led to questions about the reality of this divine hydrology. Only the *Genoese* mapmaker (#248) denied Paradise any place on the map, while *Fra Mauro* (#249) hedged on the question and the *Catalan Estense* mapmaker (#246) relocated it in equatorial Africa.

The influence of the marine charts had already in the 14th century led to modification of the abstract geographical shapes of the medieval world maps. The charts also brought with them

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a sense of direction and the idea of scaled distance, though it was not yet possible to represent this on a global scale. The twelve winds of classical antiquity were jettisoned in favor of the sea-going winds, in multiples of eight and adapted to the use of the compass. Inevitably, the evidence of sailors about coasts, distances, and geographical features began to have an impact on the content of maps, even though some of these came along with tall tales of sea monsters, sluggish seas, and magical islands.

The eastern orientation was oddly enough the first traditional feature to be eliminated; possibly Arabic influence caused more maps to be oriented to the south. Only the *Leardo* maps (#228), the *Rudimentum Novitiorum* (#253), the German broadsheets, and the *Bianco* map (#241) kept their eastern bias. The sea charts tended to use a north orientation, based on the pointing of the compass, but the larger charts often had no clear orientation so that the user could rotate them and read off the coastal names from various angles.

The Holy Land had been greatly enlarged on the 13th century *mappaemundi*, reflecting its importance and the number of places the mapmaker wanted to include. Beginning with *Vesconte* (#228), the holy land shrank drastically to put it in proportion with the rest of the world; after all, it was not a very big country, physically speaking. Some cartographers (*Vesconte* and *Sanudo*, the *Rudimentum Novitiorum* maker) made up for this insult by drawing a separate map of the holy land, which could include all its interesting features.

The monstrous races and animals were to have a long history on maps. “*Here be dragons*” is a phrase that has actually been found on only one map, the *Lenox Globe* of 1503-7 (#314), where “*He sunt dracones*” appears on the southeastern coast of Asia. Even if the phrase itself were absent, maps continued to show monstrous animals, particularly at sea, into the 17th century. As world maps developed to include the great expanses of the ocean, this empty space cried out for embellishment. Genuine monsters such as whales or giant squids were joined by enormous sea serpents and the god *Neptune*, armed with a trident, rising from the waters. The monstrous human races moved from the edges to the borders of maps, where they survived into the 19th century, sometimes transformed into individuals of various races in colorful “native dress.”

Centuries before medieval Europeans arrived, in fact, the Chinese had been telling themselves stories about the monstrous beings that lived at the world’s margins, including those in the distant, mysterious West. One ancient and much-loved work known as *The Classic of Mountains and Seas*, referred to such races as the *Loppy Ears* (who “have such big ears they flop down onto their shoulders”), the *Feathered Folk* (who “can fly, but not very far”), the *Hairy Folk* (covered in hair “like a pig”), the *Mushroom People* (whose aspect was like “a meat fungus”), and the *Progenyless Folk* (a boneless race who, because they eat only air, “are clear-headed and live a long time”).

One effect of the Ptolemaic atlases was the influence of their sober character. Most editions produced maps that showed simply geographic forms and place-names with no pictorial embellishment. The vivid effect of the densely illustrated medieval map was replaced by a more scientific-looking production, but the need for fantasy was supplied by elaborate cartouches and borders, packed with mythological figures, personified continents, ferocious animals, colorful natives, and monsters of various sorts, not to mention flowery dedications and descriptions. An

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early example: the world map of the *Nuremberg Chronicle* of 1493 (#260) was a straightforward Ptolemy-style map, but around its edges the sons of Noah embraced their respective continents, while down the sides marched a selection from the monstrous races.

World maps are never of much practical use, as the scale is too small. The pleasure and reward one gets from regarding them is more philosophical or theological. To the Middle Ages, the world map was part of a larger cosmos, the center of a gigantic nest of transparent spheres, bearing planets, stars, and angels, and eventually the ultimate sphere of God himself. The structure of the earth and the arrangement of places on its surface were not merely physical questions. The earth, as God's creation, bore important messages for the human race. Names, geographical shapes, and the history of each place were imbued with many layers of meaning. It was the task of the medieval mapmaker to present this whole as clearly and beautifully as possible. By the last half of the 15th century, the influence of the marine charts and the *Geography* of Ptolemy began to transform the way space was mapped, but it was not so easy to dismantle the received wisdom of the medieval period. Although mapmakers could incorporate the coastlines from marine charts, they did not have the capacity to measure the entire world. Astronomically determined coordinates were not precise enough for distances on the ground, and the variable length of a degree of longitude posed an, as yet, insuperable obstacle. Even determining latitude was no simple matter. In addition, mapmakers were reluctant to abandon the rich historical/theological understanding that had shaped their perception of the world for so long.

The medieval *mappamundi* was a powerful statement of medieval culture and beliefs, but the question remains, how had the image and idea been spread throughout Europe? We do not know how many large, public *mappaemundi* were made - there were certainly a great many more than survive today - but still they could not be found in every city or monastery. Even supposing someone traveled to Hereford Cathedral and looked at the map there, how long would he study it, and how much would he take away in his mind? Maps in books would be seen only by the readers, which were never very numerous. For example, we are not sure that any mapmaker was influenced by the fascinating maps of Matthew Paris (#225), for the simple reason that they were locked away in the monastery at Saint Alban's, and few people saw them. What we can gather from the material included in maps is that many of the commonplaces on them, such as their structure, came from popular texts. A small library including Solinus, Isidore, Orosius, and possibly one of the later scholastic writers, such as Honorius Augustodunensis would have supplied most of the information that appeared on medieval maps. If these books included a map as well, even a simple framework, as a number of Isidore's works did, all to the good. Some of these books were used in schools, with the teacher reading aloud to the students, and thus the information was passed along. When Chaucer says that Rosamunde was round as a "*mappemonde*," or when we learn that the Spanish composer Juan Cornago based his mass on a popular song, entitled "*l'ho visto il mappamondo*," we assume that their hearers had some idea of what they were talking about.

In the mid-15th century, the *mappamundi* was still holding its own, but in the last twenty years of the century it began to give way. Long before the Pinta, the Nina, and the Santa Maria

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sailed out of the Palos harbor, the ancient form was burst apart, and space had already been created on the map for new discoveries at all points of the compass.

In the millennium that links the ancient and modern worlds, from about the fifth to the 15th century after Christ, there developed in the West a genre of world maps or map-paintings originating in the classical tradition but adopted/adapted by the Christian church. The primary purpose of these *mappaemundi*, as they are called in the West, was to instruct the faithful about the significant events in Christian history rather than to record their precise locations. They rarely had any scientific attributes such as a *graticule* or an expressed scale, and they were often schematic in character and geometric, usually circular or oval in shape. Although several maps fitting this description are also found in the medieval Arabic culture or the cosmographies of Southwest and East Asia during this period, the European *mappaemundi* form a well-defined group. They provide a body of documents whose form, content and meaning reflect many aspects of Europe medieval life.

The making of world maps was not an identifiably separate activity in the medieval period. Their makers were not called “cartographers” and did not form a characteristic group as, for example, the *portolan* [nautical] chart-makers seem to have done by the 14th century. Some 900 of the 1,100 surviving *mappaemundi* are found in manuscript books on a variety of subjects. Moreover, they seem not to have required the services of a specialized scribe: the lettering on the maps and the adjacent text, for example, can usually be identified as being in the same hand. The vast majority of the maps that survive were produced as *ipso facto* book illustrations. In the late Middle Ages of the 14th and 15th centuries, there was a tendency to place maps on the first or second page of a codex, which may reflect the growing importance of maps in giving the reader an overview of the text.

The relation between map and text is also seen in the frequent reliance on early texts as sources for the compilation of *mappaemundi*. This raises the general question of how efficiently a map could be drawn from verbal directions, particularly without benefit of a list of coordinates from which places could be plotted. Modern reconstructions from textual sources of the lost maps of Herodotus, Eratosthenes, Strabo, Agrippa, the Ravenna cosmographer, Marco Polo, and others, attempted by geographers and historians in the 19th and early 20th centuries, illustrate the potential difficulties of such exercises.

However, there were large and detailed *mappaemundi*, particularly in the later Middle Ages, that were conceived and drawn as independent documents, although only a small number of examples survive. Since these contained extensive text or rubrics, they can hardly have been designed only for the illiterate. There is also other evidence that such maps appealed strongly to a learned audience. Jacques de Vitry, the 13th century bishop of Acre, specifically mentioned that he found a *mappamundi* to be a useful source of information. Fra Paolino Veneto, an early 14th century Minorite friar, was also explicit in endorsing their value:

I think that it is not just difficult but impossible without a world map to make [oneself] an image of, or even for the mind to grasp, what is said of the children and grandchildren of Noah and of the Four Kingdoms and other nations and regions, both in divine and human writings. There is needed moreover a two-fold map, [composed] of painting and writing. Nor wilt thou deem one sufficient without the other, because painting without writing

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indicates regions or nations unclearly, [and] writing without the aid of painting truly does not mark the boundaries of the provinces of a region in their various parts sufficiently [clearly] for them to be descried almost at a glance.

The term *mappamundi* (plural *mappaemundi*) is from the Latin *mappa* [a tablecloth or napkin] and *mundus* [world]. The word *mappa*, as in *Mappae clauicula*, the late 12th century technical treatise, could also mean a drawing or painting. In classical Latin the term could also mean a starting cloth for chariot races. Since their geometric construction was by no means consistent, *mappaemundi* can thus be distinguished from the *planisphere* (Italian *planisfero*), which usually refers to a world map that has been consciously constructed according to the principles of transformation from a spherical to a flat surface and whose primary purpose is locational. The early use of the planisphere was in astronomical charts employing a stereographic projection, as in Ptolemy's *Planisphaerium*.

It should be stressed that this rather restrictive meaning of the term *mappamundi* was not the contemporaneous use. In the 13th and 14th centuries, for example, the term was used generically to mean any map of the world, whether in the style of the *portolan* chart or not. Thus in a contract for world maps at Barcelona in 1399-1400, the terms *mapamundi* or *mappamondi* and *carta da navigare* or *charte da navichare* were all used inter-changeably. In modern Italian, the term *mappamondo* is of broad significance and even specifically includes globes.

Nor was the term used in classical Latin of the late Roman era, where the preference was for *forma*, *figura*, *orbis pictus*, or *orbis terrarum descriptio*. *Figura* was usually reserved for the small diagrams in manuscripts that functioned as scientific illustrations. The eighth century Beatus of Liebana (#207) used formula *picturarum*. For medieval Latin, Du Cange defines *mappa mundi* as an “*expository chart or map, in which a description of the earth or the world is contained.*” In the late Middle Ages other terms were also used, such as *imagines mundi*, *pictura*, *descriptio*, *tabula*, or even the *estoire* of the Hereford map (#226), although *mappamundi* was by far the most common word. On the *Ebstorf* map (#224) we find a rubric that may be rendered: “A map is called a figure, whence a *mappa mundi* is a figure of the world.” *Imago mundi* usually indicated a theoretical treatment of cosmography rather than a graphic description.

It is unwise to assume that *mappamundi* necessarily meant a graphic depiction of the world. It is also common to find the term used to mean a verbal description in a metaphorical sense, much as we talk today of “mapping a strategy”. For example, when Ranulf Higden wrote of a *mappamundi* in the *Polychronicon* (#232), he was referring not to the world map that frequently accompanies it, but to a verbal description of the world. A manuscript in the British Library entitled *Mappa mundi sive orbis descriptio* is also purely a textual account. Peter of Beauvais was the author of a French verse *mappemonde* for Philip of Dreux, bishop of Beauvais (fl. 1175 - 1217). This use of the term was still common into the 18th century: thus an 18th century manuscript version of the 13th century Spanish geography, the *Semeianca del mundo*, was entitled *Mapa mundi*. The late 12th to early 13th century chronicler Gervase of Canterbury described a gazetteer of religious houses in England, Wales, and part of Scotland as a *mappa mundi*.

Learned medieval geography—practiced above all in monastic schools (*scholae*) and in the universities (*studia*)—was based on two presuppositions. First, that the number of humans

inhabiting the known world was finite and remained unchanged ever since Noah's children and their descendants scattered throughout the Earth after the Flood. Second, that the inhabited part of the Classical world (*oikumene*) had been described once and for all by the Roman geographers Pliny, Solinus, and Orosius. These two principles had important implications in terms of method, because it meant that outlining the names of peoples and regions sufficed for updating the description of the inhabited world.

Two dominant themes relating to the geographical utility of medieval world maps can be identified in the literature since the late 19th century. On the one hand, Charles R. Beazley's desire to view the *mappaemundi* as a static phase in the gradually improving representation of the earth's features resulted from an assumption, shared by many other authors, that the sole function of maps was to provide correct locations of geographical features. In his seminal work on medieval geography, *The Dawn of Modern Geography*, Beazley dismisses two of the most celebrated *mappaemundi* with the following words: *the non-scientific maps of the later Middle Ages . . . are of such complete futility . . . that a bare allusion to the monstrosities of Hereford and Ebstorf should suffice*. This view was challenged by John K. Wright who pointed out that since geometric accuracy in the *mappaemundi* was not a primary aim or objective of the European mapmaker, the lack of it could hardly be criticized. We are now accustomed to the notion that Euclidean geometry is by no means the only effective graphic structure for ordering our thoughts about space: distance-decay maps, in which logarithmic or other scalars modify conventional latitude and longitude, were among the first products of the digital mapping age, but the concept is far from new. The 12th century map of Asia, known as one of the two Jerome maps, exaggerates Asia Minor, its main point of interest, to the point that it is almost as large as the representation of the rest of Asia (#215). A legend on the Matthew Paris map of Britain also demonstrates how map scale could be adjusted to fit the circumstances: *if the page had allowed it, this whole island would have been longer* (#225).

The geographical content of the *mappaemundi* was not always solely symbolic and fanciful, however. G.R. Crone has demonstrated that, in the case of the *Hereford* map, its content was expanded from time to time using available resources, providing a more or less continuous cartographic tradition from the Roman Empire to the 13th century. The scribe of the *Hereford* map seems to have systematically plotted lists of place-names on the map from various written itineraries, in an attempt to fulfill a secular as well as a spiritual need. Far from being a mere anthology of mythical lore, the map was thus also a repository of contemporary geographical information of use for planning pilgrimages and stimulating and inspiring the intended traveler.

The second theme, which Bevan and Phillott introduced as early as 1873, draws attention to the historical or narrative function of the medieval world maps. This theme has been developed in detail by Anna-Dorothee von den Brincken in a series of articles where the European *mappaemundi* are seen as pictorial analogies to the medieval historical textual chronicles. Von den Brincken illustrates this historical function by listing, in a series of tables, the place-names appearing on twenty-one selected maps. In addition to the expected frequent occurrence of the centers of Christianity (Jerusalem, Rome, Constantinople, Antioch, and Patmos), a surprising

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number of secular places of historical interest are found, such as *Olympus*, *Taprobane*, and *Pergamon*, together with several secular places of particular interest and adapted this function to religious ends. The medieval romances, particularly those describing the exploits of the classical heroes, frequently use a *mappamundi* as a symbol of military dominance. In medieval religious life, a *mappamundi* might stand as a representation of the world, for the transitorine time, such as Kiev, Novgorod, Samarkand, and Georgia. More specialized studies on the early appearance of place-names on medieval maps confirm this view. For example, the 10th century *Cotton* map (#210) contains an early reference to Bulgaria.

The *mappaemundi* may thus be seen as analogous to the narrative medieval pictures that portray several events separated by time and included within the same scene. Instead of being presented in sequence as in a frieze or cartoon, they are placed in their logical positions in the picture. For the *mappaemundi*, this meant the approximate geographical or topological location of the event. The medieval view of the *mappaemundi* is adequately expressed by Hugh of Saint Victor about 1126: *We must collect a brief summary of all things . . . which the mind may grasp and the memory retain with ease. The mind chiefly esteems events by three things: the persons by whom deeds were done, the places in which they were done, and the times when they were done.*

There was more than a mnemonic function, however. The monumental size and method of display of some of these world maps suggest that there was also a public iconographic role: thus the Agrippa map of about 100 A.D. (#118) may have stood for the dominance of the Roman Empire over most of the world. Medieval literature and the *mappaemundi* both mirrored this classical symbolizes of earthly life, the divine wisdom of God, the body of Christ, or even God himself. The God-like image is best seen in the *Ebstorf* map (#224), where the head, hands, and feet of Christ are represented at the four cardinal directions, with the map itself standing for the body of Christ.

Another illustration of a similar metaphor is seen in the many diagrammatic views of the tripartite globe represented as an orb held in the left hand of a sovereign, Christ (as *Salvator mundi*), or God the Father. Usually the three-fold division is drawn in perspective so as to conform to the shape of the globe. The representation of the orb as a symbol of imperial or royal power was derived from Roman times where it appears on many coins of the late Roman period. A simple version of the globe also sometimes appears under Christ's feet in representations of the Last Judgment. Less schematic but still decorative and symbolic representations are found in the often reproduced world map in Jean Mansel, *La fleur des histoires*, which clearly represents a spherical earth divided among the three sons of Noah (examples of these themes can be seen in images #205). With an obvious exception in the curious maps of Opicinus de Canistris (#230) and the truly transitional maps such as Martellus (#256), most medieval *mappaemundi* share no obvious formal or functional similarities with other maps of the same period, such as the *portolan* charts and the regional, topographical, or cadastral maps. The geographical content of the first *portolan* charts that begin to appear in the late 13th century bears no apparent relationship to that of the *mappaemundi* of the same time. The *portolan* charts do not appear to have had any visible influence on other maps before the 13th century, thus joining other strong evidence that seems to controvert the hypothesis of C.H. Hapgood in his *Maps of the Ancient Sea Kings*:

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Evidence of Advanced Civilization in the Ice Age and other writers that the origin of the *portolan* charts extends back to pre-classical times. It is also difficult to agree with scholars such as Beazley and Cortes that *the absurdities of Dark Age map-making are precursors of the first accurate charts and modern atlases*, unless the term *precursor* is simply used chronologically. Indeed, the fact that the *Carte Pisane* (to which Beazley was referring) and the *Hereford* map are products of the same age exemplifies how two cartographic genres can exist side-by-side. These two maps appear to have been compiled in quite different environments, assuming entirely different functions and structured in different ways. The former is of mercantile origin, the second monastic.

Learned medieval geography—practiced above all in monastic schools (*scholae*) and in the universities (*studia*) — was based on two presuppositions. First, that the number of humans inhabiting the known world was finite and remained unchanged ever since Noah's children and their descendants scattered throughout the earth after the Flood. Second, that the inhabited part of the Classical world (the *oikumene*) had been described once and for all by the Roman geographers Pliny, Solinus, and Orosius. These two principles had important implications in terms of method, because it meant that outlining the names of peoples and regions sufficed for updating the description of the inhabited world. According to Cattaneo these two presuppositions would be subject to discussion following the convergence of two main historical processes.

The first was the enrichment of the range of geographical knowledge by discoveries that were largely textual ones from the 14th century onwards. In 1330-1335, Francesco Petrarch and Giovanni Boccaccio discovered *De chorographia* of the first century geographer Pomponius Mela (see #116), and this was followed by the discovery of other ancient treatises of Roman geography. Petrarch's awareness of the importance of Pliny's *Naturalis historia*, the first six books of which are devoted to cosmography and geography, combined with the narratives of pilgrimages to the Holy Land and of travels to the Near East and to Asia by Franciscan missionaries and merchants, brought about an initial redefinition of the *imago mundi* in the Late Medieval period. From the late fourteenth century onwards the chief exponents of Venetian and Florentine humanism as well as that of the Roman Curia dedicated themselves to the rediscovery of the geographic treatises written not only by Roman authors, but also by the ancient Greeks.

The second process that facilitated the transformation of the *imago mundi* was that of geographical discoveries. It was the outcome of commercial journeys and of the conquest of areas outside the Mediterranean Sea basin, first by those of the Portuguese and the Spaniards along the African coast, and then by the voyages towards the 'spice islands' in the Indian Ocean and the 'New Worlds' in the Atlantic Ocean. The first were the voyages to the Canaries (1341) and to the Azores (before 1424), the voyages of the Portuguese sea captain Gil Eanes beyond Cape Bojador (1434), the discovery of the islands of Cape Verde (1454- 1461), and the navigations of Diogo Cão and Bartolomeu Dias to the southern coast of Africa below the Equator that brought to the circumnavigation of the continent around 1488. These were followed by the first voyage from Lisbon to Calicut, on the western coast of India by Vasco da Gama, Pedro Alvares Cabral's journey to the *Terra de vera Cruz*, present-day Brazil, Gaspar Corte Real and Americo

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Vespucci's travels in the name of Portugal's monarch, and those by Christopher Columbus and Vespucci in the name of the Spanish crown, of John and Sebastian Cabot for the English crown, and of Giovanni da Verrazzano and Jacques Cartier for the French crown.

Between the Iberian shores and the eastern coasts of the *oikumene* and so to speak 'Cattigara' (*Aurea Chersonneso*) placed at 180 degrees of longitude from the Canary Islands (*Fortunatae Insulae*), between 120 and 1350, following Mongol expansion to the West, enormous continental and insular spaces were configured increasing and modifying the form of the *oikumene* as defined in Ptolemy's *Geography*. From a strictly European cosmographic perspective, a new geography emerging from the voyages of medieval merchants and missionaries attached itself to the *imago mundi* inherited from the geographers of antiquity like Pliny, Strabo and Ptolemy. The vast regions ranging from 'Cathay' [northern China], 'Mangi' [southern China] and 'Ciampa' [Indochina] to 'Cipangu' [Japan] were placed beyond the eastern limits of the Roman ancient world around 1300. Cartographers subsequently became the interpreters of extremely heterogeneous texts and languages, not only the narrative of classical geographers but also the more recent ones of merchants and missionaries, often transmitted orally and based on the accounts of ship captains and diplomats. The latter were inserted into the graphic structure of nautical and Ptolemaic cartography. The cartographers' task became that of giving graphic and geographic form to pieces of information that only in exceptional cases included detailed reports on distances, which were usually expressed in days of travel or miles.

In the later medieval period, three distinct methods of compiling maps have been identified as existing side-by-side. The *portolan* chart seems to have been constructed incrementally (from the inside out, as it were), relying on the natural closures provided by the basins of the Mediterranean Sea and being bounded only by the natural shape of the vellum on which it was drawn. The *mappaemundi* appear to have been compiled with the assumption that there was a finite amount of information to be fitted into a predetermined bounding shape, be it a rectangle, circle, oval, or other geometrically definable figure. This space is often partitioned schematically into segments. A third system assumed a regular net of parallels and meridians into which geographical information could be placed. Although described in an astronomical, astrological, and geometric context in the Middle Ages long before the reception of Ptolemy's *Geography* into the West, rectangular and spherical coordinate systems for terrestrial mapping were not fully accepted until the 15th century. These three cartographic systems existed in largely separate traditions until the *portolan* charts began to influence the later *mappaemundi* in the early 14th century and the Ptolemaic manuscripts of the *Geography* overturned Western notions of map-making in the 15th. Such was the practical value of the *portolan* charts, however, that by the 14th century their influence was being revealed in the *mappaemundi*. Although the usually circular form of the map was retained, now accurate outlines of the Mediterranean Sea and other areas traditionally found on the *portolan* charts, together with their characteristic rhumb lines, were beginning to be frequently found on *mappaemundi* from the 14th century. In the 15th, even graphic scales were sometimes added.

There was a closer and earlier affinity between the *mappaemundi* and the regional maps and itineraries. Regional maps were also compiled by authors in the monastic tradition, and the

larger-scale maps were no doubt used as source material for the smaller, their style and content often being similar. In some cases the extent of the regional maps was so large, as in the Jerome map of Asia, that they have been mistaken for fragments of world maps. The use of pilgrim and trade-route itineraries, some of which dated from Roman times, was also a common practice in compiling the *mappaemundi*. For example, Crone has made a careful analysis of the use of these sources in the *Hereford* map.

The Study of *Mappaemundi*

As in other aspects of the history of cartography, scholars wishing to study medieval *mappaemundi* have found major difficulties. These include the incompleteness of the record, the difficulty of compiling general works summarizing the widely scattered literature from many fields, and the large capital cost of preparing published catalogs and facsimile atlases from which comparisons could be made. The need for these tools was recognized as the value of *mappaemundi* as cartographic, historical, and artistic documents came to be fully realized. This was not until the middle of the 19th century, but since then there have been several landmark texts that have improved the situation.

The cartographic historian R.A. Skelton believed that the wastage or loss of maps up to the 16th century was more severe than that for any other type of historical document. Although one may prefer to be less categorical, there is direct literary evidence that many medieval maps have not come down to us. Some of these would have been large and considered important in their time. We also know by inference from later versions of such world maps as those of Orosius, Isidore, and Macrobius that the key prototypes in the early medieval period are missing. For the later period, the few inventories of monastic libraries that have been published are excellent sources of references to *mappaemundi* that apparently existed as separate items. The frequency of these allusions suggests that many more large *mappaemundi* were lost than have come down to us. This underlines the need to admit to the imperfect or provisional nature of the conclusions drawn from such an incomplete sample.

The first general study of *mappaemundi* was that of Manuel Francisco de Barros e Sousa, second viscount of Santarem (1791-1856). Although Santarem had drawn attention to those of his predecessors who had shown more than passing interest in the subject, such as William Playfair (1759 - 1823) and Plácido Zurla (1769-1834), it was Santarem himself who first attempted a general synthesis of the subject. His work, accompanied by a magnificent facsimile atlas of 117 *mappaemundi*, of which only 21 had previously been published, is still a useful summary. Major contemporaries of Santarem (in some cases his rivals) who made significant contributions to the general history of medieval world maps included Edme François Jomard (1777-1862), Joachim Lelewel (1786-1861), and Marie Armand Pascal d'Avezac-Macaya (1799-1875). The contribution of Jomard, the head of the map department of the Bibliothèque Impériale, was a rival facsimile atlas that contained thirty medieval world maps. Lelewel's work, again accompanied by a small facsimile atlas, stressed the Arabic and not the Western contribution to the genre, clearly an unusual slant for the period. It was the subject of a detailed review by Santarem. D'Avezac-Macaya, although he helped Santarem with his facsimile atlas, for which he is acknowledged, is

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better known for his work on individual maps and the history of projections. However, nothing rivaling the importance of Santarem's study and atlas appeared until the six-volume survey of *mappaemundi* by Konrad Miller (1866-1944). This thorough and careful work was extremely well received and was rapidly accepted as the standard text, as is shown by reviews.

While Miller's volumes were being published, Charles Raymond Beazley (1858-1951) was producing his three-volume history of geographical travel and exploration in the Middle Ages. Beazley did not always appreciate the full meaning of the *mappaemundi*, but he was well aware of the importance of maps in revealing the geographical spirit of the age. He thoroughly described almost all the major world maps of the period in a series of chapters and appendixes, arranged chronologically, and his work, along with Miller's, still provides a wealth of detail not available elsewhere.

On balance, Beazley's three-volume work was more a contribution to the history of geographical exploration than to the history of geographical thought. It was the historians of science who developed the framework for the history of medieval cosmographical concepts. Pierre Duhem's multi-volume survey still remains a standard source for the subject, despite more recent claims that his approach suffers from *precursorism*. Other historians of science and technology, including the founder of the modern field of that study in Europe and America, George Sarton, made detailed if scattered contributions to the subject in *Introduction to the History of Science*, as did the team of historians working for the seven-volume *History of Technology* under the leadership of Charles Singer. The influence of the Harvard historian of science Charles Haskins must also be specifically mentioned: his student John K. Wright's doctoral dissertation led to his *Geographical Lore*, a masterly work with several chapters on the cartography of the period and an excellent bibliography. Among the most original contributions to the study of the late period of medieval cartography, however, was Dana Bennett Durand's monograph on the *Vienna-Klosterneuburg* map corpus, based on his doctoral dissertation submitted to Harvard's history department under the supervision of Sarton. Durand demonstrated the previously unrecognized existence of a group of maps in the 15th century that was partly independent of both the Ptolemaic and the medieval traditions of regional and world maps, and, that appeared to form a transitional link between medieval and Renaissance cartography. He also provided a useful summary on the cultural context of these maps.

By far the most useful reference work for the comparison of medieval *mappaemundi* yet to appear is the sixteen-volume facsimile atlas initiated and financed by Prince Youssouf Kamal but compiled by Frederik Caspar Wieder (1874-1943). Although confined to maps illustrating the exploration and discovery of Africa, it contains almost all major medieval maps that include Africa, reproduced photographically, making it the single most valuable source of illustrations of these maps. However, the work has two main drawbacks: first, it lacks specific descriptions of the maps reproduced, except where they relate to the discovery of Africa, and second, the distribution of the work was limited to one hundred copies. In addition to the many accounts and chapters in general works on the history of maps of varying completeness and accuracy, there have also been some outstanding encyclopedia articles on the subject. Some of the most valuable general book-length treatments of the historiography, context, form, and allegorical content of

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mappaemundi is the doctoral dissertation of Jorg-Geerd Arentzen and J.B. Harley and D. Woodward, *History of Cartography, Volume One, Cartography in Prehistoric, Ancient and Medieval Europe and the Mediterranean*. These works also have particularly valuable general bibliographies.

Systematic comparative work on *mappaemundi* depends on a general census. Some catalogs of maps in national libraries and listings of maps (including *mappaemundi*) held in particular countries, such as the one for Italy by Uzielli and Amat di San Filippo and the one for Germany by Ruge, had been published by 1916, but the idea for a general listing of medieval maps was not proposed until 1949, by Marcel Destombes at the Sixteenth International Geographical Congress in Lisbon, and a Commission on Early Maps was formed to prepare a four-volume catalog of medieval maps, as follows:

1. *mappaemundi*;
2. nautical charts;
3. regional maps, including Ptolemy; and
4. printed maps.

Volume 4 appeared in preliminary form in 1952. Volume 1, covering the manuscript *mappaemundi*, appeared in 1964.

Victoria Morse, in the *History of Cartography*, Volume IV, discusses the role of maps in later medieval society, the 12th to the 14th century. The Middle Ages has been described as a period that “knew little of maps,” and indeed the number of surviving examples, even if allowances are made for what was probably an extremely high rate of loss, do not suggest that maps were produced and consumed in particularly large numbers between the fifth and 14th centuries. This assessment is reinforced by what we know of the physical production of maps, which was limited by hand copying, the use of parchment and other expensive supports, and the low level of private ownership of, and of markets for, books and maps until at least the 13th century. Nevertheless, the patient examination of the surviving evidence of map production and use is beginning to suggest that, while maps may not have been as commonplace at all levels of society during the Middle Ages as they became during subsequent periods or in other cultures, they were important and—at least to some audiences—familiar means of expression and communication. Tucked away in the secrecy of books or exhibited on the walls of churches, cloisters, and royal or princely palaces, the image of the earth was displayed abundantly during the Middle Ages.

Although medieval maps often used to be described as copying a few standard models and repeating a tired assortment of information drawn from classical and biblical sources, it is becoming increasingly clear that they, like all other maps, should instead be understood as tools for thinking and as flexible means of communicating ideas. In the Middle Ages, as in other periods, maps could be shaped and manipulated to meet particular needs as their authors drew from graphic and textual traditions, from experience, and from their own ideas to create individual artifacts suited to given contexts. As Gautier Dalche has emphasized, maps, like other representations, do not inform us generally about contemporaries’ perceptions of space, but rather about the mental and technical tools available to the mapmaker. Medieval maps must, in short, be approached not as transparent windows into their creators’ and users’ minds but as

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rhetorically constructed documents belonging to specific times and specific contexts. Recent studies have emphasized the importance of exploring these contexts, whether the specific codicological context of a particular manuscript or the larger social and cultural setting in which the map was conceived, as essential to understanding the full meaning of a given map within its society.

One particularly fruitful aspect of this more contextualized and differentiated approach to medieval maps is the growing awareness of change within the period. Instead of a monolithic “medieval map,” we are now able to recognize that maps, like other texts and artifacts, have their own histories that exist in a complex relationship with the cultures that produced them. Recent examples of attention to change in response to the historical moment range from the role of the Crusades in the gradual development of the tendency to locate Jerusalem at the center of world maps to the increasing sense of English national identity expressed on the *Evesham* map (#236.2) during the Hundred Years War. Von den Brincken locates this development after the middle of the 13th century, attributing the centrality of Jerusalem to heightened European awareness after the city’s re-conquest by the Muslims in 1244. Likewise, it is now easier to appreciate the variety of forms of medieval maps, instead of taking the world map as the archetypal form. The other widespread map types—especially the *portolan* charts, but also local, regional, and city maps — are no longer seen as aberrations or precursors of post-medieval development but as contemporary forms of cartographic expression that collectively helped define the medieval experience of maps.

This awareness of the changes in the form, content, and use of maps during the medieval period is particularly helpful when we turn to the difficult problem of the transition between medieval and Renaissance cartography. The meaning of the labels “Medieval” and “Renaissance” has long been debated, as have the degree and nature of the change between the two periods. The tendency in the history of cartography to look to the Renaissance for the birth of modern mapmaking has led to an overemphasis in this field on the discontinuities with the medieval past. The undoubted continuities between the two periods are dismissed as medieval survivals, astonishing to modern observers for whom the *portolan* charts of the later Middle Ages and the *Ptolemaic* maps of the later 15th century seem so obviously superior to the zone maps and *mappaemundi* that continued to be produced. More recent studies have begun to examine the maps of the transitional 14th and 15th centuries more carefully, outlining the continuities and attempting to define the changes that undoubtedly did take place between the medieval and early modern periods more precisely at the specific levels of individual artifacts, thinkers, and communities. These studies must be compared with recent work that focuses attitudes toward the representation and control of space in medieval experience, including the development of territorial conceptions of legal jurisdictions and intellectual changes in quantification and measurement. Only with the careful examination of specific cases over time will we begin to see more precisely how the transition between medieval and Renaissance mapping took place and to appreciate more fully its roots in the profound social and cultural transformations of the later Middle Ages.

The broad division of medieval map forms into world maps, *portolan* charts (#250.1), and local and regional maps and plans provides a helpful starting place for a discussion of the roles of

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maps in the later Middle Ages. These individual traditions have in the past been seen as almost completely independent of one another, to the point that some scholars have suggested that the Middle Ages had no concept of a “map” as a category distinct from diagrams, pictures, and other representations. The idea that there was little cross-fertilization among medieval maps has become untenable with new discoveries and a new appreciation of the sheer numbers of medieval maps. Nevertheless, the categories remained sufficiently distinct in many 12th and 13th century works that they provide a useful framework for discussion.

Much of the early scholarship on medieval world maps focused on creating typologies, some of considerable complexity. More recently, the tendency has been to simplify the categories and terminology used to describe world maps and to explicate the meaning of individual maps by examining their functions within their specific contexts rather than by situating them within clearly defined families of maps. The most far-reaching revision of the typologies of medieval world maps calls for the recognition of just two basic types of map: those taking a global view of the earth and those focusing only on the *oikoumene*, or the inhabited world as it was conceptualized by late Roman and medieval thinkers, comprising in modern terms the regions of Europe, North Africa, and Asia, especially Asia Minor.

A more moderate revision proposed in the first volume of *The History of Cartography* would reduce the number of major types to four: *tripartite*, *zone*, *quadripartite*, and *transitional*. The first category comprises those maps that show the inhabited part of the earth as it was conceptualized in the Middle Ages, divided implicitly or explicitly into the three regions of Europe, Africa, and Asia. A subgroup of this category is the T-O map (#205), which gives a schematic view of the three regions and the waterways—the river *Tanaïs* or Don, the Nile, and the Mediterranean Sea—dividing them. The zone map, in contrast, takes a global view of the earth, indicating its division into five *climata* or zones defined by temperature, including two cold polar regions, a northern and a southern temperate zone, and a hot equatorial zone. The quadripartite category accommodates maps that combine the two previous categories, showing the tripartite division of the known world and the existence of a further landmass south of the equatorial zone. Finally, the transitional category highlights the important developments of the 14th and 15th centuries as world maps began to incorporate material from the *portolan* charts and from the newly discovered maps of Ptolemy’s *Geography*.

This classification is particularly useful in its recognition of the transitional maps as a separate and noteworthy category and for its simplification of earlier schemes. Evelyn Edson in her book *Mapping Time and Space* adopted a categorization based on a combination of formal characteristics (especially the distinction between T-O and zone maps) and degree of detail. Although interesting as an attempt to emphasize the context and purpose of the maps over their formal characteristics, this system has not yet been adopted more generally. Classification itself has been criticized, however, for its continued use of subcategories named for the authors of certain classical and late antique texts that, in medieval manuscripts, were often illustrated by maps (e.g., “Isidore,” “Orosius,” or “Sallust” maps). First, such nomenclature can give the misleading impression that the maps in question originated in the texts with which they are most commonly associated or were even the work of the original author. This false conclusion obscures

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the interesting and problematic early history of medieval world maps, only some of which seem to go back to late antique origins, while others were most likely inventions of the early Middle Ages. Second, there is abundant evidence that, although maps with certain sets of features might tend to be copied with certain texts, the associations are far from rigid or straightforward. Recent research emphasizes instead the frequency with which maps migrated from one work to another and the flexibility of medieval copyists in choosing maps to illustrate given works or in altering their cartographic models at will. The *Evesham* map (#236.2), for example, is very similar to the maps that appear in the chronicle of Ranulf Higden (#232), but it seems to have been produced as an independent document, rather than being copied as part of a manuscript. Finally, the focus on the origins of medieval maps tends to obscure the importance of the specific choice that led to the production of a given map at a given moment and for a given purpose. Even a straightforward copy of an existing map takes on a new range of meaning and a new significance from having been selected and copied under a particular set of circumstances.

A final issue concerning the forms of world maps is the question of whether a map's formal structure provides clues to its function. It has been argued that zone maps were typically used to convey astronomical and astrological information, while tripartite maps tended either to focus on historical, ethnographical, and spiritual meanings or (in their more schematic form) to serve as a convenient icon indicating the earth. In part, these associations stem from the assumption that certain map types belonged exclusively with certain texts, an idea that, as we have seen, has been called into question. Nevertheless, in spite of the much more fluid relationship between maps and texts that we now know to have been typical, especially of the later Middle Ages, there does seem to be some truth to a correlation between form and meaning. This is best seen in the rather extreme example of Opicinus de Canistris (#230), who turned to the zone map as the foundation on which to elaborate his spiritual cosmography because of the emphasis that this map form placed on the earth as a part of the larger system of the universe, caught at the center of a web of astral forces.

The current tendency in the study of medieval world maps is to deemphasize questions of origin, descent, or classification and to look instead at function and context. A sign of the growing maturity of the field, this approach shows that the history of cartography is finding a place within the mainstream of medieval cultural history. Students of medieval cartography must bear in mind that world maps are multivalent, weaving together various ideas about the world to form unique artistic and cultural statements. Thus, although it is necessary to try to sort out the component threads of meaning that make up individual maps, the task must be undertaken with sensitivity to the categories available within medieval culture as well as those that modern interpreters find helpful to impose on their medieval sources. Although the following discussion uses the terms "history" or "religion" to discuss the roles and functions of the maps, it should be borne in mind that a medieval audience would not have made these distinctions in this way. Indeed, I will attempt to indicate something of the complexity of the social and intellectual frameworks within which maps were produced and used.

It is important to situate 12th and 13th century mapmaking within a much larger interest in understanding the physical world. This interest arose in many different areas of high medieval

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culture, from philosophical and scientific efforts to explain the natural laws underlying the functioning of the universe, to the popularity of poetic depictions of the world and its places, to changes in descriptions of administrative and jurisdictional territories. The world maps from this period were influenced by these broader concerns, and one of their defining characteristics is the very diversity of the purposes they served and the contexts within which they occurred.

One of the most influential contributions to the study of medieval cartography has been the idea that world maps were intended to describe time as well as space. Since the publication of two highly influential articles by von den Brincken on the close relationship between universal chronicles—those that attempted to sum up all of human history in one work—and world maps, it has been widely accepted that one function of these maps was to give an overview of the world, understood as the theater of human, and especially Christian, history. As a result of this parallelism between map and chronicle, it is common to find, rubbing shoulders on world maps, what one author has called “landmarks of the six ages [of the world]”: ancient cities like Troy and Rome, biblical events like the Hebrews’ crossing of the Red Sea and the landing of Noah’s ark on Mount Ararat, and contemporary pilgrimage sites like Santiago de’ Compostela. This approach to these documents has much to recommend it and has played a central role in freeing the study of medieval maps from anachronistic expectations about their purpose and content by focusing attention on the needs and attitudes of the culture that produced them. Salvation history has, however, become over-generalized as an explanation for the world maps, serving occasionally more to circumvent than to explore the problem of the maps’ meanings. There are two issues to bear in mind. First, the Christian tradition had a complex idea of history, eschatology, and the salvational process, and it is essential to understand how these issues are being approached in any particular map and with what specific meaning. Second, the assimilation of human knowledge and activity into the framework of creation and salvation did not in any way exclude the “lower” human meanings, nor was salvation history seen as detached from the physical aspects of the world.

Within their broad function as representations of space and time, world maps could serve a wide variety of more specific rhetorical needs. One way to explore the functions of the world map in medieval society is through the multivalent meanings of the world itself in the learned culture of the time. Part of the curiosity about the physical world that characterized the 12th century was the desire to understand the earth as a part of a system. The concern among philosophers for the *machina universitatis* or the *machina mundi* led them to focus on the system underlying the universe and the laws that governed it. The details of the earth itself (*terra*, both the planet and the element earth) were of less interest to them than the grand mechanism of the world (*mundus*). Contrasted with this interest in the *machina mundi* was the equally vibrant idea of *contemptus mundi* [renunciation of the world], which drew on a related but different definition of the “world” to contrast the ascetic life with the life of ordinary secular affairs. “Secular” recalls the term *saeculum* that contrasted “the world of men and of time” with the eternal world of the Christian God. Between these extremes were the views of historians, pilgrims (whether armchair or actual), and other travelers, for which locations and events on the earth did matter and needed to be recalled.

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Many of the medieval world maps that have survived do so in the company of other schematic drawings, often of a cosmological nature, in *computus* manuscripts and encyclopedias. A staple of monastic education in the early Middle Ages, *computus* was the body of knowledge necessary to allow the calculation of the dates of the moveable feasts of the Christian year, especially Easter. Branching out from the strict calculation of Easter, many *computus* manuscripts compiled other materials relating to time, the heavens, and theories of the interconnections between the heavens, the earth, and man that were fundamental to medieval science and medicine. Many of the excerpts commonly associated with *computus* were drawn from the works of the Venerable Bede, but the collections also included classical texts and others by medieval authors on a variety of subjects — including history — connected with the idea of time broadly conceived. In addition, they frequently contained diagrams designed to summarize and complement the textual presentations, and they sometimes contained maps. These maps might appear as simple elements of more complex diagrams; this was a common use of the T-O maps, often labeled with the word *terra*, which might signify, for example, the earth at the center of a diagram explaining the effect of the moon on the tides. Some manuscripts also included more highly elaborated world maps containing historical as well as cosmographical information. *Computus* has been convincingly described as an “organizing principle in clerical education,” so that, even after calculating the date of Easter became a less universally required skill with the development of reliable tables, these texts continued to be copied, sometimes in impressively produced manuscripts. Knowledge of the information included in these works played a role in the formation of clerical identity and suggests the importance and familiarity that maps and associated diagrams of earthly and cosmological phenomena would have had among at least some parts of the clerical elite.

Medieval encyclopedias exhibit the same tendency to bring together diverse materials around a loose common theme of the structure and history of the world. They are one of the most interesting settings in which to study medieval representations of the world, because their very heterogeneity allowed for the inclusion of all sorts of map types, from zone and tripartite world maps to regional maps and from maps as separately conceived images to tiny T-O maps within larger cosmographical diagrams. Despite the diversity of topics and materials that characterizes encyclopedias, their larger goal was generally to demonstrate the fundamental unity of the created universe through a synthesis of human knowledge. The maps too can be understood, as has already been noted, as different perspectives—offering different degrees of detail—on the single, complex, world system.

The frequent appearance of maps in works designed to serve pedagogical and popularizing functions is an index of the popularity of what one scholar has called the “passionate discovery of the reality of the world” that characterized the intellectual movement known as the 12th century Renaissance. Scholars sought to understand the laws that governed the universal system or *machina universitatis* through the development of reasoned theories and careful speculation about such issues as the existence of the antipodes, a habitable zone in the southern hemisphere diametrically opposite the northern habitable zone of the *oikoumene*. This issue in particular was controversial, because the possibility of a habitable (and possibly

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inhabited) zone, the Antipodes, that was completely cut off from the known world by an impassable torrid zone called into question the completeness of the evangelization of the world and the universality of the Christian message. The very use of speculative reason to understand the world was suspect to some, moreover, because it seemed to deny the absolute power of God and to privilege a kind of natural determinism at the expense of mankind's free will.

The scientific or philosophical approach to the world was, then, a controversial one that needed to be justified and explained to a potentially hostile audience. Curiously little has been done as yet to explore the roles of the maps that frequently illustrated the arguments of such works as William of Conches's *Dragmaticon philosophiae* in stating these claims. Instead, William's attention to providing helpful visual aids is usually explained as part of a general upswing in the use of visual material to help explain complex problems; the 12th century scholar's own appreciation of the power of world maps to organize information is illustrated by one author's choice to classify a randomly ordered list of place-names based on an imagined *mappamundi*.

The idea of the earth as a point in a complex system of natural forces was developed in the 13th century, especially with reference to the influence of the astral bodies on the nature of earthly places. This form of astrological thought seems to have provided the impetus for Roger Bacon's discussion of a *figura* or drawing showing major cities located according to their longitude and latitude. Bacon has in the past been credited with considerable innovations in geographical thought, most particularly in his understanding of the use of coordinates to create an accurate graphic representation of the world's places. Recent research on the concepts of longitude and latitude in the Middle Ages suggests that Bacon was less of an innovator in this respect than previous scholars have thought, since he could draw on a well-established body of texts and techniques, including translations of Arabic scientific texts and handbooks on the use of the astrolabe, that explained the underlying theory and offered lists of coordinates for selected cities. Moreover, he probably knew of the idea of using the coordinates provided by Ptolemy's *Geography* to create a map thanks to the fairly well-known translations of *Maqālah fi hay' at al-'alam* (treatise on the configuration of the world) by Ibn al-Haytham (Alhazen). Bacon was thus not unique in his interest in locating the places of the world accurately within a system that connected them to the heavens. The lesser-known (and unillustrated) works of William of Saint-Cloud and Gerard of Feltre shared an understanding of space as a "whole composed of a set of rigorously defined points," as did the work of the Dominican Albert Magnus. Far from being in itself a trigger that would revolutionize the medieval understanding of geographical space, the knowledge of Ptolemy's use of coordinates to map the features of the world was an accepted part of medieval geographical knowledge and was enlisted to render more precise an analysis of place based on astronomical and climatological criteria.

The enthusiasm for knowing the physical world, discussed in the previous sections, played a significant role in medieval pedagogy, especially in the monastic teaching of the Carolingian and 12th century Renaissances. This was due in part to the heightened attention given in the 12th century to the literal sense of biblical exegesis: understanding the names, places, and history described in the Bible was seen as the necessary foundation for examining other meanings (moral, Christological, or eschatological). One of the proponents of this form of monastic

education was Hugh of Saint Victor, whose work also includes several items important for the history of cartography. Hugh was sensitive to the role that images could play in teaching and learning, and his extant works incorporate a wide range of visual aids, including tables and circular diagrams. According to his well-known *De archa noe mystica*, he incorporated a world map into the elaborate diagram of Noah's ark that he drew to help his fellow canons explore the many meanings of this symbol of the Church and Christian salvation. Recent research has also attributed to him a treatise, *Descriptio mappe mundi*, that describes a detailed world map; the text is probably based on lecture notes from lessons that involved the discussion of an actual wall map. Although there are no extant maps or diagrams associated with either text, Hugh's interest in maps as representations of the physical world and as tools for teaching is clear. Indeed, one recent author considers his approach in the *Descriptio mappe mundi* revolutionary in its acceptance of a map, as opposed to a written text, as an authoritative source of information about the world.

In conclusion, the surviving examples of world maps, along with other texts, images, and references to maps, bear witness to the passionate interest in the real world described by Gautier Dalche. The variety of functions that these maps could play reflects the multifarious meanings of the world in medieval culture, as the maps served to describe, analyze, summarize, and create knowledge and perceptions about the fundamental spaces of human existence. These were works destined for both elite and somewhat more popular audiences—including pilgrims, parishioners, and consumers of romances—to whom they helped provide visual, intellectual, and imaginative access to the larger world. As we have seen, the sensitivity of recent scholarship to the specific contexts in which maps appeared and the ways in which they were used has given us new insights into the complexity and subtlety of the potential meanings of medieval world maps, although much remains to be uncovered about the perception and representation of space in this fertile period of cartography.

The Form of *Mappaemundi*

Contemporary evidence on the methods of construction of *mappaemundi* is extremely scanty. However, while the artifacts themselves often speak eloquently about how they were made, much more intensive scrutiny of the original artifacts needs to be done by scholars, this is one of the least studied periods of the history of cartography. The following by David Woodward, excerpted from Harley and Woodward's *History of Cartography Volume I*, attempts to treat the design and development of medieval maps thematically. This will include a discussion of the framework, concepts of the shape of the earth, projections and coordinate systems, the production of *mappaemundi* (inks and pigments, lettering, signs, and color), and the content and meaning of the maps as revealed in the factual aspects of their geography, the more fanciful legendary traditions, and their complex symbolism.

It has been suggested that the medieval world maps were normally conceived within a pre-established frame of a limited selection of geometric shapes: circular, oval, rectangular, or *mandorla*, each shape having its own symbolic connotation. This is borne out by Hugh of Saint Victor's (ca. 1097-1141) description of how to draw a *mappamundi* in the shape of an ark, his

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instructions clearly being more related to the mystical functions of the map than to any geographical use. In the absence of a first-hand description of the compilation methods of maps of the size and complexity of the *Hereford* or *Ebstorf* maps (#226 and #224) it is difficult to imagine how places could be fitted into the outline. Since no *graticule* or scale was apparently drawn, one must assume that once the border, the center, and the tripartite division were established the countries and other details were broadly sketched in and adjusted until they fulfilled the designer's intentions.

Close physical scrutiny of a large sample of the original documents might well yield further evidence about these frameworks in the same way that calligraphers are now finding detailed clues to the history of their craft by examining medieval manuscripts with such technical questions in mind. A parallel study for maps has yet to be systematically undertaken, although it must be admitted that the lack of large *mappaemundi* is a major barrier to this approach.

In geography and cartography, the persistent influence of classical Greek learning in medieval times is shown partly by the tenacity of the notion of the earth's sphericity, despite modern popular writers who have assumed that medieval (and even early Renaissance) man believed, during these 'Dark Ages' that the earth was flat. This myth may have been perpetuated by some historians who have tended to emphasize the unusual beliefs of the period and even to accept these as the norm. For example, many general histories devote undue consideration to the concept of a flat, rectangular, four-cornered earth with a vaulted heaven from the sixth century *Christian Topography* by Cosmas Indicopleustes (#202). It is important to realize that Cosmas' text, now preserved only in two manuscripts, was not thought worthy of mention by medieval commentators, with the exception of Photius of Constantinople, who said not only that *the style is poor, and the arrangement hardly up to the ordinary standard* but also that *he may fairly be regarded as a fabulist rather than a trustworthy authority*. Cosmas' concepts were derived from the following biblical passages: Isa. 40:22, *God sits throned on the vaulted roof of earth*; Matt. 24:31, *With a trumpet blast he will send out his angels, and they will gather his chosen from the four winds, from the farthest bounds of heaven on every side*; and Rev. 7:1, *After this I saw four angels stationed at the four corners of the earth, holding back the four winds*.

The relationship of the concept of the *Antipodes* to that of the earth's sphericity has also been a source of confusion. The fathers of the church were embarrassed by a doctrine that implied the existence of a race not descended from the sons of Adam. But it was intellectually possible to believe that the earth was a sphere without subscribing to the idea of the Antipodes. It was about the latter that Virgil of Salzburg and Pope Zacharias confronted each other in the ninth century, not about the sphericity of the earth. The shape of the earth seems to have been much less a subject of debate.

A further confusion resulting from literal interpretation of biblical sources arose from the apparent incompatibility of the circular form of the earth and the four corners referred to in the Bible. The German encyclopedist Rabanus Maurus (ca. 776-856), for example, asked how circular and quadrate shapes could agree and went on to relate this problem to that of Euclid's squaring the circle. The medieval cartographer's solution was either to portray the circular earth within a square, leaving convenient spaces in the corners for iconographically suitable images, such as the

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symbols for the four evangelists, or to place the square within the circle so that the four cardinal directions and the circular earth could be combined.

Despite the difficulties of literal biblical interpretation, most early fathers of the church agreed that the earth was a sphere. Augustine specifically mentioned it at least twice. Saint Augustine, *De civitate Dei* 16.9: *They fail to observe that even if the world is held to be global or rounded in shape . . . it would still not necessarily follow that the land on the opposite side is not covered by masses of water.* The works of the popular secular writers such as Pliny, Macrobius, and Martianus Capella also contain many references to its sphericity. Less well known is Ovid's description in the *Metamorphoses* 1.3236:

Whatever god it was, who out of chaos
Brought order to the universe, and gave it
Division, subdivision, he molded earth,
In the beginning, into a great globe,
Even on every side.

Perhaps in over-reaction to these 'pagan' works, Severianus and Lactantius were to take the opposite view, but the importance of their works, which have interested historians perhaps because of their controversial nature, has probably been exaggerated.

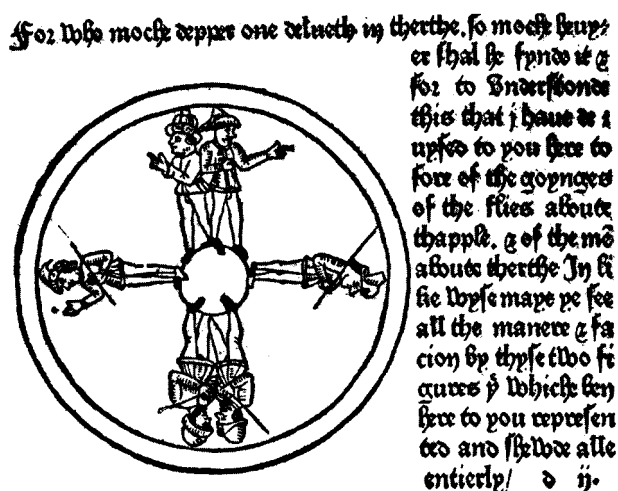
The case of Isidore of Seville (#205) perhaps merits particular attention in view of the widespread influence of his writings, especially the *Etymologies* and *De natura rerum*. Isidore is clear about the sphericity of the universe: *The sphere of the heavens is rounded and its center is the earth, equally shut in from every side. This sphere, they say, has neither beginning nor end, for the reason that being rounded like a circle it is not easily perceived where it begins and where it ends.* While he uses the word *globus* several times in *De natura rerum* in connection with the moon or the planets, he neglects to comment directly on the sphericity of the earth itself except in the following passage: *The ocean, spread out on the peripheral regions of the globe, bathes almost all the confines of its orb.*

Other passages in his texts, however, have been used to support the idea that Isidore thought the world was flat. In one place, he described the earth as a wheel: *The circle of lands [orbis] is so called from its roundness, which is like that of a wheel, whence a small wheel is called orbiculus.* In another passage, he seems to have misunderstood the Greek concept of parallel zones from his reading of the *Poeticon Astronomicon* of Hyginus. He took too literally the statement that the lines separating the zones should be drawn as circles on a globe, and disregarded the possibility that these might look different when drawn on a flat surface. The zones thus appeared as five circles mechanically placed on a disk: *In describing the universe the philosophers mention five circles, which the Greeks call parallels, that is, zones, into which the circle of lands is divided.... Now let us imagine them after the manner of our right hand, so that the thumb may be called the Arctic Circle, uninhabitable because of cold; . . . the northern and southern circles, being adjacent to each other, are not inhabited, for the reason that they are situated far from the sun's course.* Such an interpretation can hardly be taken as evidence of Isidore's belief in a flat earth, however, when it reflects his inability to grasp the basic geometry of

the Greek concept of the *climata*.

In another passage, Isidore seems to say that, when it rises, the sun is visible at the same time to people in both east and west: *The sun is similar for the Indians and the Bretons in the same moment that both see it rising. It does not seem smaller for the Orientals when it is setting; and the Occidentals, when it rises, do not find it any smaller than the Orientals.* Two interpretations are possible of the phrase *in the same moment that both see it rising*. It could mean that the rising sun is visible at the same time to people in both east and west, thus implying a flat earth. It could also be interpreted to mean that the size of the sun appears the same to those in the east and west at the time of its rising.

Despite Isidore's apparent confusion about the shape of the earth revealed in these passages, the evidence appears to confirm that he thought the earth, like the universe, was a sphere. He was joined in this view by other influential Christian writers, some of whom explained the reasons thoroughly. For example, the Venerable Bede (672-735) was careful in his explanation: *The cause of the unequal length of the days is the globular shape of the earth, for it is not without reason that the Sacred Scriptures and secular letters speak of the shape of the earth as an orb, for it is a fact that the earth is placed in the center of the universe not only in latitude, as it were round like a shield, but also in every direction, like a playground ball, no matter which way it is turned.* Saint Thomas Aquinas (ca. 1227 - 74) argued that the earth must be spherical because changes in the position of constellations occur as one moves over the earth's surface.



*Demonstration of the Earth's Sphericity
in the 13th century.*

Gautier de Metz explained that if two travelers left from the same place in opposite directions they would meet at the other side of the earth. Diameter of the original detail: 8.2 cm. From a printed edition of *Image du monde* (London: Caxton, 1481).

Late medieval commentators also generally agreed that the earth was a sphere. Aristotle's elegant three-part demonstration of the sphericity of the earth and the astronomical works of Ptolemy for which the concept was essential, were well known to the West after the 12th century. The text of the *Catalan Atlas of 1375* (#235) clearly states that the world is a sphere 180,000 *stades* in circumference. With the exception of a few polemical works against the idea, such as Zachariah Lilio's *Contra Antipodes*, the medieval scholar would have agreed with Gautier de Metz that *a man could go around the world as a fly makes the tour of an apple*. The same theme is echoed in the writings of William of Conches, Hildegard of Bingen, Adam of Bremen,

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Lambert of Saint-Omer, Vincent of Beauvais, Albertus Magnus, Robert Grosseteste, Sacrobosco, Roger Bacon, and a score of others. Dante used the idea of a spherical earth to set his *Divine Comedy*, probably the most widely disseminated vernacular work of its type. Moreover, he apparently felt not the slightest need to justify his view. Even John Mandeville, whose *Travels* (ca. 1370) were immensely popular (albeit later ridiculed), explained that the earth was spherical and that the Antipodes could indeed exist.

In the broadest sense, any transformation from one surface to another, and thus from a sphere to a plane, involves the process called projection. It could be argued, for example, that even the simple *Macrobian* diagrams (#201) with their parallel *climata* drawn on a circle were drawn on a projection crudely approximating an orthographic projection (equatorial aspect). The circular *climata* on the globe were thus portrayed with straight parallel boundaries on the flat map. It is possible to extend this argument to all *mappaemundi* and to point out, for example, that the world map of Matthew Paris (#225) and the Jerome map of Asia (#215) seem to have been constructed on “projections” approaching the *azimuthal logarithmic*, where the central part of the map is enlarged in scale.

Deliberate systems of projection, however, that reveal a conscious knowledge on the part of their compilers of a transformation of coordinate positions, are not found in the Middle Ages until the time of Roger Bacon. In his *Opus maius* (1268), Bacon describes a map, which has not survived, that he appended to the work, which seems to demonstrate that he had a clear idea of the value of using a systematic coordinate system to transform and inventory the positions of places:

Since these climates and the famous cities in them cannot be clearly understood by means of mere words, our sense must be aided by a figure. In the first place, then, I shall give a drawing of this quarter with its climates, and I shall mark the famous cities in their localities by their distance from the equinoctial circle, which is called the latitude of the city or region; and by the distance from the west or east, which is called the longitude of the region.

Then he goes on to describe a system of projection (which he calls a “device”) in which the positions of places may be known by their distance from the equator and central meridian. The parallels are equally spaced on the meridian quadrant 90 degrees east or west of the central meridian (not on the central meridian itself). This implies that the spacing of the parallels on the central meridian would decrease toward the pole. The meridians are equally spaced on the equator. From such a description it is clear that Bacon’s “device” was certainly not the orthographic projection that Cortesão reports.

It took an unconventional thinker like Roger Bacon to overcome this mental barrier theoretically. In his *Opus maius*, written in 1267, he re-examined ancient sources, including Aristotle’s *De caelo* [On the Heavens], which was only translated into Latin during the second half of the 12th century. His reading led Bacon to a re-evaluation of the proportions of land and water and thus to the simple conclusion that the extent of the ocean between Spain in the east and India in the west was not insuperably vast. Bacon illustrated this in a rough sketch representing the Atlantic Ocean and the two poles as larger circles (with west on top). The

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Atlantic Ocean thus appears as a rather small barrier between India (*principium indie*) and Spain (*principium hispanie*). This suggests that, at least theoretically, India could be reached by sailing westwards from Spain. The fact that Bacon explicitly referred to Seneca, who stated that the Ocean was navigable, suggests that his argument centered on navigation.

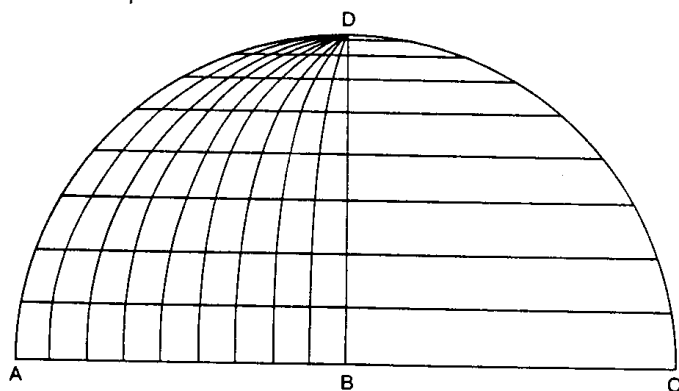
By contrast, in his *Image du monde* (ca. 1246) the French encyclopaedist Gautier of Metz still imagined the ocean and seas as barriers. For instance, in order to explain the spherical shape of the earth, he wrote that if there were no water or other barriers, a man could circle the earth on foot, just as a fly can circle an apple. Stating this, Gautier seemed to perceive the ocean as an unnavigable barrier that could be crossed only hypothetically. On the other hand, Bacon's sketch, by focusing on the water-body as a navigable link between distant lands, was based on the same concept as the *portolans*; according to Bacon, India was located over the ocean.

Most modern maps are based not only on a specific projection but also on a system of mathematically constructed coordinates. However, since the primary function of *mappaemundi* was not locational (other than in the crudest topological sense), sophisticated coordinate systems are not to be expected. They were not, anyway, widely available in medieval Europe until the translation of Ptolemy's *Almagest* into Latin in the 12th century and the *Geography* in the 15th. These two texts may have provided medieval mapmakers with the crucial idea of an ordered space by the use of a pair of unique coordinates. On such a graph, information about the sky and the earth could be systematically inventoried. One of the earliest of these, dating from the first quarter of the 11th century, is a curious graph showing the passage of the sun and the planets through the zodiac. Here there is evidence of a clear notion of celestial longitude and latitude that would probably have been derived from Pliny's encyclopedia. It includes thirty parts of longitude and twelve parts of latitude within the zodiac.

As discussed by Irene Malfatto in her article "Cosmography and Transatlantic Voyages", *Encyclopedia of the History of Science* (June 2020), the intellectual framework of late medieval Europe had been undergoing substantial developments and changes from at least the 13th century. The introduction of Aristotelianism and Arabic science and the establishment of the first universities in the 12th century revolutionized the system of learning in the West and opened up new perspectives in the study of nature. By the 13th century, intellectuals were trying to connect the newly recovered knowledge to the traditional authorities. Besides the development of scholastic theology, culminated in Thomas Aquinas' *Summa Theologiae*, encyclopedias such as Vincent of Beauvais's *Speculum Naturale* attempted to provide a summa of knowledge that incorporated a range of existing sources. The circulation of new texts encouraged the development of new and original ways of thinking about the universe and natural phenomena. A fundamental role in medieval history of science was played by the 13th century English philosopher Roger Bacon, who discussed in his *Opus Maius* the importance of empiricism and promoted the application of mathematics to all fields of scientific inquiry, ranging from optics to astronomy and geography. The eventual integration of Latin Christian and Islamic knowledge, as well as the compilation of encyclopedic works across Latin, Greek, Arabic, and Hebrew traditions, offered organic repositories of medieval thought in the 14th and 15th centuries.

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Cosmographic knowledge in this period was inseparable from this broader transition in late medieval and early Renaissance knowledge. Bacon's book, for example, included a map of the world, and even discussed the extent of the oceanic distance separating Spain from India. At the turn of the 15th century, his observations were excerpted and copied into the influential cosmographic compendium *Imago Mundi*, compiled by cardinal Pierre d'Ailly (#238). Another major event around that time was the recovery and Latin translation of Ptolemy's *Geography*. Both Pierre d'Ailly's and Ptolemy's books are among Christopher Columbus' known readings, the former preserved in a copy annotated in the Admiral's own hand. One more work rediscovered in the context of the humanist revival was Pomponius Mela's *De chorographia* (#116), a first-century geographical treatise contemplating, among other things, the possibility of the existence of *Antipodes* in the southern hemisphere.



Reconstruction of Roger Bacon's Map Projection.

In this 13th century map projection, Bacon fixes the position of a point by its distance from the equator and a central meridian. The parallel of latitude is drawn straight and parallel to the equator through the place's latitude on the colure (AD and DC). The meridians are represented as arcs of circles through the pole and the longitude of the place on the equator, except the central meridian, which is straight.

Although both the *Almagest* and the *Geography* remained unknown to the Western medieval world before the 12th century, the concept of longitude and latitude had nevertheless filtered into northwestern Europe by the early 11th century, largely through contacts with Islamic scientists in Spain. For example, al-Zarkali (ca.1029 to ca.1087), a Spanish Muslim from Cordova, was the principal composer of the Toledo Tables. These tables contain a long list of geographical coordinates based on the prime meridian of the Canaries. For the first time, the length of the Mediterranean was given correctly as 42 degrees of longitude.

There had also been attempts to measure longitude in the 11th and 12th centuries. Petrus Alphonsus (1062-1110) gave an explanation of the relation between time and longitude in his *Dialogi cum Iudaeo*. Walcher's observation of lunar eclipses on 19 October 1091, on 18 October 1092, and in 1107-12 demonstrated a clear understanding that longitude could be expressed as a difference in time between two places: a lunar eclipse in Italy was seen shortly before dawn, whereas in England it had been observed in the middle of the night. Later in the same century, Roger of Hereford reported that the eclipse of 12 September 1178 was observed simultaneously in

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Hereford, Marseilles, and Toledo and calculated the longitude of these places in relation to the meridian of *Arin*, the mythical center of the Islamic world.

Neither the early techniques of graphic representation of coordinates nor the ability to measure longitude as the difference in time between two places can be shown to have had a direct influence on medieval cartography. Coordinates, for example, were used exclusively to calculate the relative time differences of places required in astrology rather than to aid in locating them on a map or globe. But although there is no clear testimony of the use of geographical coordinates in Europe, between Roger Bacon and the first *Vienna-Klosterneuburg* maps of about 1425, the principles must have remained latent. The lack of maps drawn on this principle in this period, therefore, may have had more to do with the availability of reliable positional data than with the existence of a method of properly plotting it.

The Production of *Mappaemundi*

Mappaemundi were regarded primarily as paintings in the early Middle Ages. Since their makers were “map painters” rather than “cartographers” in the modern sense of the word, the methods, tools, and materials used for these maps were those of the medieval artist in general. In particular, since the vast majority of these maps were produced for manuscript books, the techniques involved are indistinguishable from those used in manuscript illumination. Although yielding its place as a major art to architecture and sculpture in the course of the 12th century, illumination was the focus for many major medieval artists and arguably constituted the greatest of the early medieval arts.

The manuscript book was not the only vehicle for *mappaemundi*. The images appear in a variety of forms and materials. They are seen in stained-glass windows, frescoes, and floor mosaics, in reredos and tympana decoration, as sculpture, and even carved in benches. Most commonly, however, they are found in manuscript encyclopedias, Bibles, and *psalters*. Thus, the vast majority were drawn and painted on parchment with a variety of inks and pigments. Parchment is any kind of animal skin prepared for writing or drawing; it is a general word for such material and does not specify the animal, whether sheep, calf, goat, or whatever. Vellum was sometimes used to refer to calf-skin and fine parchment, but the distinction has become less clear.

Records relating to the cost of *mappaemundi* or of the materials on which they are drawn are scanty. There is a mention in the account books of the monastery at Klosterneuburg of a series of payments for a *mappa*. Scholars believe that the high cost of this particular map (thirty florins) and the probable reference to making a case for it (payment of six *talers* for a locksmith) suggests that it was large and elaborate. Other sources of information, unfortunately now lost, were the account books of the monastery of San Michele di Murano, in which was found a notice concerning the copying and transmittal of the *mappamundi* (presumably for King Afonso V of Portugal) in the workshop of Fra Mauro, but without the details of the expenses.

The attitude of medieval artists toward imperfections seems to have often been casual, as regards either the parchment or the drawing of the maps. For example, on the Jerome map of Asia, a hole in the vellum (about 3 x 5 cm) had been patched and sewn with another small piece

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before the map was drawn. The patch itself was then used to represent Crete, its shape preordained by the defect in the material. On the verso of the same leaf, on which a map of Palestine is drawn, the edge of the patch becomes the Caucasus Mountains from which the Ganges, Indus, and Tigris rivers are shown to spring.

Several treatises on the materials and pigments used by medieval illuminators can help in reconstructing the methods used in the technical creation of the *mappae mundi*. Three are outstanding for their detail: *Mappae clavicula* (late 12th century), *De arte illuminandi* (late 14th century), and the *Libro dell'arte of Cennino Cennini* (late 14th century). These treatises are the recipe books of painting; they describe natural elements, minerals, and vegetable extracts as well as the artificial, manufactured salts used in preparing pigments.

Two types of ink were known and used in the Middle Ages. One was a suspension of carbon and the other a suspension of black organic salts of iron. Those *mappaemundi* drawn and lettered in ink used the same materials as any other manuscript, and the iron inks became the more common writing medium. They were sometimes mixed with gallic and tannic acid obtained from oak galls, providing an intense purple-black ink that darkened with age.

The complex systems of map signs employed in modern cartography were less developed in the classical period and the Middle Ages. Instead, map features were often described with rubrics or legends, some of which could be extremely long. *Mappaemundi* were thus quite as much written as drawn. Calligraphic styles follow those prevailing in the texts of the time and thus can provide at least a very rough guide to the origin and chronology of the maps. For instance, there are the national hands of the sixth to the eighth century (although very few maps survive from this period), the Carolingian minuscules of the eighth to the 12th century, and the Gothic or black letter in its various forms of the 12th to the 15th century. Also common on *mappaemundi* are the semi-formal crossbred current styles known as *littera bastarda*, combinations of the cursive everyday secretarial hand and the more formal black letter.

Lettering was not usually laid out on the *mappaemundi* in a systematic manner, nor was there usually an attempt to rule guidelines. In some cases the vellum had been routinely ruled up for text before the map was drawn and there is sometimes an attempt to follow the lines. This can be seen, for example, in one of the Ranulf Higden maps in the British Library (#232), or in the *Cotton Anglo-Saxon* map (#210), where the map was drawn on the verso of a page on which lines had been scored. The scored lines show through the page, and the artist obviously made a conscious attempt either to line up the lettering or to avoid them. In some reproductions of the *Cotton* map, such as those in Beazley or Miller, the lines can be seen, but it is important to realize what they are and that they have no substantive meaning. Such a point is a reminder of the importance of examining originals in order to avoid unfounded conclusions.

The inclusion of explanatory matter on the face of the map obviated the need for separate keys of signs. The occurrence of what have been called "silent maps" lacking any lettering was exceptional among *mappaemundi*. However, one example, the late 13th century world map in the *Livre dou tresor* of Brunetto Latini lacks lettering possibly because Latini might have used an Arabic model on which the legends were in Arabic, a language he could not transcribe. In the later Middle Ages, explanations of the map painter's intentions are sometimes found on the

map itself, as in the case of the 1448 world map of Andreas Walsperger (#245). Walsperger explains his system of distinguishing between Christian and Islamic cities: *The earth is indeed white, the seas of a green color, the rivers blue, the mountains variegated, likewise the red spots are cities of the Christians, the black ones in truth are the cities of the infidels on land and sea.*

The use of color is widely varied on the *mappaemundi*, but certain deep-seated conventions, such as blue or green for water and red for the Red Sea, are usually followed. Occasionally, unusual coloring is seen, like the bright Mozarabic colors of the *Beatus* maps, or the gray sea and orange rivers of the *Cotton Anglo-Saxon* map (#207 and #210).

Signs for towns and mountains on *mappaemundi* had to be designed to overcome the problem of representing something in plan. Mountains were shown by chains of curves or spikes, teeth, heaps, lobes, or plaited ornamentation (guilloche). Towns were differentiated by stylistic pictures of groups of buildings seen from the side. Their realism varied depending on the map-maker's familiarity with the place. The Arabic world maps are generally more abstract in their use of signs, using circles for cities.

The Content and Meaning of *Mappaemundi*

The content of *mappaemundi* may be conveniently discussed under three headings: the historical and geographical facts; the marvels, legends, and traditions; and the symbolic content. Of these the greatest emphasis in the literature has traditionally been on the first two categories, particularly it often seems in order to demonstrate the short comings of medieval learning, such as the errors in the location of places and features on the earth and the curiosities associated with medieval fable and legend. The third category, symbolic content, has received little attention until recently, but its importance in understanding the meaning and historical significance of the *mappaemundi* is demonstrative.

Historical and Geographical Information

The factual information on medieval world maps is a blending of historical events and geographical places, a projection of history onto a geographical framework. As with the medieval popular illustrations, in which a story is told by the simultaneous portrayal of various stages of the narrative within a single frame, a *mappamundi* not only represents static geography but is also an aggregation of historical information the map-maker considered important with regard to his audience, no attempt being made to separate or identify the two types of information. This dual problem of man's status in the world and the universe which Bertrand Russell has called "chronogeography" was a prime question of the medieval philosophers.

The sources of historical and geographical information available to the makers of *mappaemundi* were both classical and biblical. The emphasis on the latter increased toward the end of the Middle Ages. Both traditions were rich in historical and geographical lore, the commemoration of famous events and places being sometimes inseparable. The biblical tradition in the *mappaemundi* is usually derived from the *Old* rather than the *New Testament*. In early Judaism the importance of the location of events was emphasized, but early Christianity showed little interest in such things, with certain important exceptions such as the journeys of Saint Paul.

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The teachings of Christ emphasized the spiritual and not the physical world. In addition, although the Bible is full of references to places of local interest, there are few allusions indeed to cosmography: the words *sphere*, *globe*, or *hemisphere* in the geographical sense are nowhere found in its pages.

In reaction to the classical geographers, the early fathers of the church were also anxious to stress that knowledge of the earth was of strictly secondary importance to the Christian, whose eyes should be on a higher spiritual plane.

In the absence of a grid of latitude and longitude, the main locational structure of the *mappaemundi* was provided by prominent hydrographic features. Three of these, the river Don, the Nile River or the Red Sea, and the Mediterranean Sea provided the boundaries within the tripartite world. Around the entire world was the encircling ocean, an enduring tradition since the time of Homer (#104). Indenting the edge of the circular world are the prominent gulfs of the Red Sea and the Mediterranean; the Caspian Sea is also often shown as a small gulf in the northeast. The Gulf of Azov, the *Palus Maeotis* of classical times which becomes *Meotides Paludes* on the *mappaemundi*, also sometimes appears as a small gulf of the surrounding ocean, as on the Corpus Christi College, Oxford version of Higden's map (#232), or the 1119 world map of Guido of Pisa (#216). This idea appears to have been derived from the passage in 2 *Esdras* prescribing that all the earth's hydrography had to be connected in some way, a point taken up by Saint Basil.

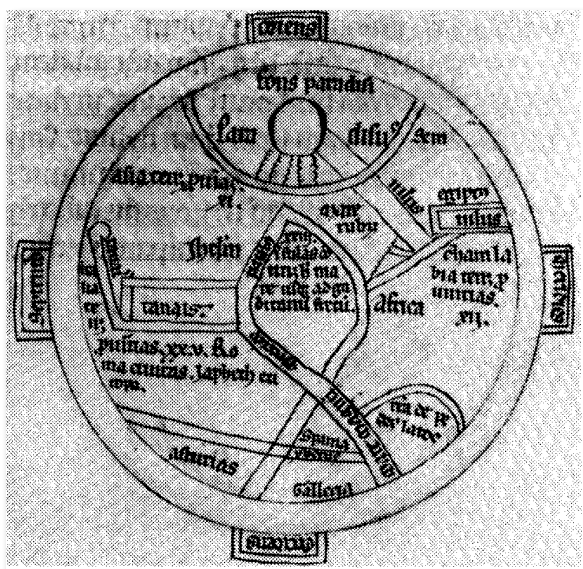
Although the four rivers of *Paradise*, the Tigris, Euphrates, Pishon, and Gihon are usually shown on *mappaemundi* as fanning out from the location of Paradise in a simple, stylized fashion, they were also represented as real rivers: the Tigris, Euphrates, Ganges, and Indus, as on the Jerome map of Palestine (#215). The Nile is sometimes equated with the *Gihon* and shown as an extension of this river, as in a map found in a 10th century manuscript of one of Isidore's works (#205). The persistence of the confusion over the correct location of the rivers of *Paradise* is shown by Columbus, who, on hearing a report that his men in the caravel Correo had seen four rivers at the head of the Gulf of Paria on the third voyage in 1498, thought they were the rivers of Paradise.

Many 14th and 15th century *mappaemundi* contain a representation of the *River of Gold*, Strabo's *Pactolus* and the *Rio del Oro* of the Middle Ages. The *River of Gold* was thought to be the flood reaches of the Niger above Timbuktu, and there were several attempts during the 14th century to develop a route to it from the coast of West Africa. It appears on the *Catalan Atlas* (#235), the *Borgia* map (#237), the *Catalan-Estense* map (#246), and *Fra Mauro's* map (#249) of 1459 (to cite only the better-known world maps), usually in the form of a bulging lake in the course of the river, into which four or five rivers flow from the western *Mountains of the Moon*.

Information regarding human settlements on *mappaemundi* was also derived from a mixture of classical and biblical sources. The names of classical peoples, tribes, regions, and cities took their place with the names of the newly formed bordering nations in eastern and northern Europe. For example, the regions of the Slavs, Bulgaria, Norway, and Iceland all appear on the *Cotton Anglo-Saxon* map of the 10th century (#210). The *Henry of Mainz/Sawley* map (#215) includes Denmark and Russia. The *Psalter* map (#223) shows Hungary and Russia; and Bohemia, Poland, and Prussia appear first on the *Ebstorf* map (#224), then on the *Hereford* map (#226).

and on maps by Higden (#232) and Fra Paolino. Sweden first appears on the maps of Lambert of Saint-Omer (#217), and Finland is found on the Vesconte (#228) and Fra Paolino world maps and on the printed world map in the *Rudimentum novitiorum* (#252).

Similarly, together with such classic regions as *Gallia*, *Germania*, *Achaea*, and *Macedonia*, the names of more recently organized provinces and states of commercial importance came to be inserted, as with the appearance of Genoa, Venice, and Bologna in Italy, or Barcelona and Cadiz in Spain. Some cities had ceased to exist long before the maps were drawn but their historical importance merited their mention, such as Troy in Asia Minor and Leptis Magna and Carthage in North Africa. Other cities were included in the maps because of their contemporary political importance, e.g., Rome and Constantinople.



The Nile as an Extension of the Four Rivers of Paradise. This schematic T-O map, from a 10th century manuscript of Isidore of Seville, shows the Nile with two sources: one in Paradise and another in Africa. 11.5 cm diameter

As the influence of the classical tradition declined, biblical sources became more prominent. Although originally Roman, the basic structure of the tripartite diagrams now owed their form to the tradition of the peopling of the earth by the descendants of Noah. The families of Shem, Ham, and

Japheth are sometimes listed on the maps in full, taken from the passage in *Genesis*. Noah's Ark, Mount Sinai, the Tower of Babel, Babylon, the Dead Sea, the river Jordan, Samaria, and the twelve tribes of Israel are also shown. Although the *New Testament* provided much less of the content of the *mappaemundi* by the later Middle Ages, those places that evoke the life of Christ and the apostles tended to be marked. In addition to Jerusalem, we find Bethlehem, Nazareth, the Sea of Galilee, Damascus, Ephesus, Antioch, Nicaea, Tarsus, and even the tombs of Saint Thomas, Saint Philip, and Saint Bartholomew identified on the *Beatus-Saint Sever*) and *Ebstorf* maps (#207 and #224).

Pilgrimage goals were often emphasized on *mappaemundi*, and the associated itineraries provided the source for many of the place-names, as is demonstrated in the *Hereford* map (#226). Santiago de Compostela in Spain and Mont Saint-Michel in Brittany were commonly shown. Not surprisingly, Rome appears on almost every map, reflecting its multiple role as the old imperial capital of the West, the seat of the papacy, and the city of many churches where indulgence was offered to pilgrims. Jerusalem's importance as the greatest of all Christian pilgrims' goals is underlined not only by its appearance on most *mappaemundi*, but also by the popularity in the same period of detailed maps of the Holy Land.

Marvels and Legends

Representations of monstrous races and historical legends on *mappaemundi* reflected the medieval craving for the bizarre and fantastic. In classical times, especially in Greece, such a demand had been expressed in the invention of mythical creatures with religious associations, such as centaurs, sirens, and satyrs. Non-religious images were formed of monstrous races of men who inhabited progressively more remote areas as more of the earth became known. Many of these ideas derived from empirical observation, for example, the *Amyctyrae* with protruding lower lips could well have been based on remote contact with the African Ubangi tribe. The Table below summarizes the main groups of semi-mythical races that appear on medieval *mappaemundi*.

The sources of the monstrous races go back at least to the fifth century B.C. to writers such as Herodotus, Ctesias of Cnidos (fl. 398 B.C.), and Megasthenes (ca. 303 B.C.). The last two had apparently traveled to India, where most of the marvels were assumed to be found. With Alexander the Great's invasion of India in 326 B.C., a body of legend grew out of his travels that was revived in the Middle Ages in the form of the Alexander romances. Although the Greek geographer Strabo (64/63 B.C. to A.D. 21) disdained the reports of these marvels and monstrous races, being "*seized with disgust for such worthless writings that contribute neither to adorn nor to improve life,*" Pliny the Elder was less critical, and it was his writings that had considerably more influence on medieval thought. His *Historia naturalis* (ca. A.D. 77) contained a vast collection of geographical lore culled from hundreds of sources. Much of Pliny's encyclopedic work is of great descriptive value, but it was largely the bizarre that was transmitted to the Middle Ages. The *Collectanea rerum memorabilium* of Gaius Julius Solinus (third century A.D.), for example, emphasized the marvels and little else. Popular writers like Macrobius and Martianus Capella, although enlightened in several matters such as the zonal concept and the sphericity of the earth, also perpetuated the monster legends in later medieval times. All the great encyclopedias of the later Middle Ages contain references to monsters: Isidore, Rabanus Maurus, Honorius, Gautier de Metz, Gervase of Tilbury, Bartolomeus Anglicus, Brunetto Latini, Vincent of Beauvais, and Pierre d'Ailly. Inevitably, maps incorporated into these works also featured them, right into the 15th century where they continued to appear in printed illustrated histories and cosmographies, such as those by Hartmann Schedel, Sebastian Münster, Andre Thevet, Sebastian Franck, and other Renaissance figures. However, there was also the skeptical and perhaps nostalgic view, such as that expressed by Francois Rabelais (ca. 1495-1553):

I saw an incredible number of attentive men and women... they held a mappamundi and spoke eloquently of prodigies... of the pyramids and the Nile... and of Troglodytes, of Himantopodes, of Blemmyae... of Cannibals.... There I saw Herodotus, Pliny, Solinus... and many other ancients... all writing beautiful lies.

The monstrous races also posed a number of problems for the fathers of the church. If they existed, and there was general agreement that they did, were they human? And if they were human, were they descended from Adam and Noah, possessing souls that could be saved? Several biblical passages stated that the gospel must be preached to all nations of men, which

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was taken to include the “monsters”. Hence, the main target of the medieval missionaries were the *Cynocephali*, the dog-headed peoples sometimes associated with Islam, whose conversion would have created a dramatic demonstration of the power of the gospel. These creatures are thus found on the didactic *mappaemundi*. The *Borgia* map, for instance, contains a representation of the dog-headed Saracen, under the rubric: *Ebinichibel is a Saracen Ethiopian king with his dog-headed people* (#237).

The placing of the monstrous races on the world map varied according to the three main types of *mappaemundi*. In tripartite maps, the races were usually crowded into a band in the southernmost part of Africa, no particular attempt being made to link the position of these peoples with climatic or other physical factors, a location derived from Pliny. An additional advantage, in the eyes of medieval ecclesiastics, would have been their being shown as far as possible from the civilized center of the earth, Jerusalem, but, as the *Ebstorf* map (#224) vividly shows, still within the reach of the left arm of Christ.

List of the Main Semi-mythical Races Found on *Mappaemundi*

Name	Characteristics	Location	Maps
Amyctyrae	Protruding lower or upper lip	Africa	Ebstorf
Anthrophagi	Maneaters; drink from skulls	Scythia; Africa	Walsperger; Ebstorf
Antipodeans	Opposite-footed	Antipodes	Beatus
Artibatirae	Walk on all fours		Psalter
Astomi	Mouthless; apple smellers	Ganges	Walsperger
Blemmyae	Faces on chests; no necks; also known as Acephali	Libya (Africa)	Walsperger
Cyclopes	One-eyed; also known as Monoculi	Sicily; India	Walsperger
Cynocephali	Dog-headed	India	Borgia; Hereford; Ebtorf; Walsperger; Psalter
Epiphagi	Eyes on shoulders (similar to Blemmyae)		Psalter
Hippopodes	Horsesí hooves	Africa	Ebstorf
Maritimi	Hold bow and arrow (four eyes)	Africa	Psalter; Ebstorf
Martikhora	Four-legged beasts with menís heads	Africa	Hereford; Ebtorf
Sciopods	Shadow-footed (also called Monocoli, from the Greek, causing confusion)	India	Beatus; Hereford; Psalter
Troglodytes	Cave dwellers	Ethiopia	Walsperger; Psalter



Cynocephali on the Borgias Map (#237)

A dog-headed people, associated with Islam and supposed to exist in Ethiopia, the Cynocephali were prime candidates for conversion by medieval missionaries and were therefore frequently shown on the didactic *mappaemundi* as in the upper right here. Size of the original detail: 12 x 7.2 cm

In the zonal maps, the Antipodes have to be taken as the guide to the location of the monstrous races, since usually very few descriptions, verbal or graphic, are given on the maps themselves. In contrast, those maps that show a fourth continent,

especially the *Beatus* type of map (#207), which aimed to illustrate the mission of the church in the conversion of all peoples of the world, contain the earliest extant representations of the monstrous races, together with detailed rubrics.

The fear of races and spiritual forces outside Christianity gave rise to two other legends that appear so frequently on *mappaemundi* that they merit individual explanation. These are the legends of the mythical Christian king Prester John and the suggested existence of nations associated with the names *Gog* and *Magog*. *Gog*, and his subjects *Magog*, appear in *Ezekiel* and in *Revelation*, where they are described as the forces of the Anti-Christ who will be loosed at the Day of Judgment to overrun the civilized earth. Alexander the Great is said to have built a wall, with a great brass gate in the Caucasus Mountains, in order to contain them. On the *mappaemundi*, *Gog* and *Magog* were personified as two giants situated somewhere in the northern or northeastern part of Asia. Sometimes they were shown contained by *Alexander's Wall*, often mistaken for a representation of the Great Wall of China.

The Kingdom of Magog.

The purpose of this wall which derived from the Alexander legend was to contain *Gog*, whose hordes in the kingdom of *Magog* were supposed to overrun the world on the Day of Judgment. Since it was situated in Asia, such depictions have been mistaken for the Great Wall of China. The detail is from the 13th century *Psalter* map (#223). See the separate monograph on *Gog & Magog*.



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The Prester John legend, which Cortes has called “*the greatest hoax in the history of geography*,” concerns the existence of a mythical Christian king. Prester John, it was hoped, would act as a rear-guard ally of the Christians in their struggles with the Islamic empire. The story of Prester John started in Rome in the early 12th century. It was given credence by a forged letter of 1163 purporting to be from the mysterious priest-king John in India to Emmanuel of Constantinople and Frederick Barbarossa, describing the wealth and power of his kingdom. Pope Alexander III replied to this letter in 1177, asking if Prester John would pledge his support to reconquer Jerusalem for Christendom. The original letter (which is known to us in a hundred manuscripts and many 15th and 16th century printed editions) was to influence several attempts to find and make political contact with this mythical king. The efforts of Prince Henry the Navigator were particularly noteworthy in this regard; he sent his chamberlain, Antao Goncalves to explore the coast of West Africa in 1441 with the instruction that “*he not only desired to have knowledge of that land, but also of the Indies, and of the land of Prester John, if he could.*” According to Cortes the story did not appear on any map until Carignano’s chart of about 1307, where the king is found in Ethiopia, albeit rather indistinctly. In the Vesconte and Sanudo world maps of about 1320 (#228), Prester John is shown in India. On several maps thereafter until well into the 16th century, the king is featured in India, China, and several parts of Africa, usually as a throned monarch holding a staff surmounted with a cross. As successive expeditions failed to find him, the choice of possible locations was progressively narrowed, and his image appeared to migrate accordingly.

As mentioned above, centuries before medieval Europeans arrived, in fact, the Chinese had been telling themselves stories about the monstrous beings that lived at the world’s margins, including those in the distant, mysterious West. One ancient and much-loved work known as *The Classic of Mountains and Seas*, referred to such races as the *Loppy Ears* (who “have such big ears they flop down onto their shoulders”), the *Feathered Folk* (who “can fly, but not very far”), the *Hairy Folk* (covered in hair “like a pig”), the *Mushroom People* (whose aspect was like “a meat fungus”), and the *Progenyless Folk* (a boneless race who, because they eat only air, “are clear-headed and live a long time”).



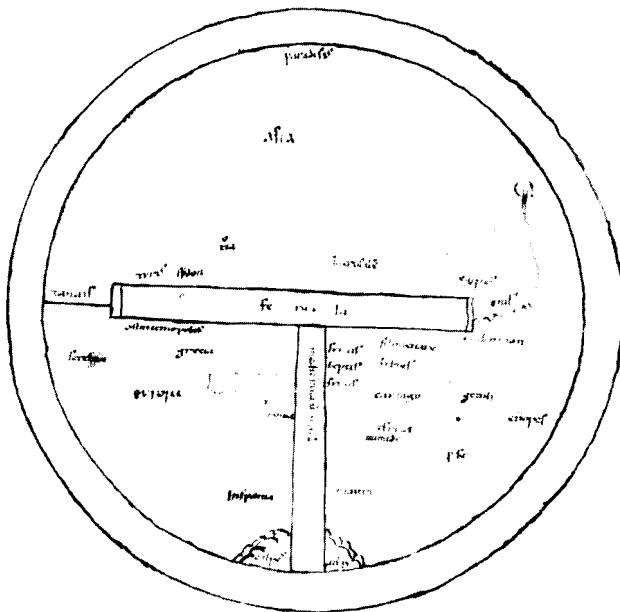
Monstrous beings believed by the ancient Chinese to inhabit the world's distant places (i.e., the West), note the similarities to those reported by the West to exist in Africa and Asia

Symbolism in *Mappaemundi*

The function of medieval *mappaemundi* was largely exegetic, with symbolism and allegory playing major roles in their conception. This was acknowledged at the time. Hugh of Saint Victor (ca. 1097-1141) defined a symbol as “a collecting of visible forms for the demonstration of invisible things.” It can be inferred from this that Hugh was assuming symbols to have graphic form, whereas modern writers of medieval history and literature tend to refer to symbolic imagery in a strictly verbal rather than a graphic sense. The modern medieval historian is also more concerned with the abstract, mystical meaning of symbolism, the cross as a symbol of the Passion, for example, than with the spatial symbolism relating to the shape of the cross as representing the four directions of the universe in which the influence of God is found: height, depth, length, and breadth. There is, however, support for the notion that medieval man thought in concrete and literal ways in addition to the mystical and allegorical. Scholars have pointed out that Saint Gregory of Nyssa (fourth century) even extended the spatial imagery of the cross to the two-dimensional view: the four quarters of the world and the four cardinal directions, and even to the four-part division of Christ’s clothing after the Crucifixion.

Many such visible forms representing spiritual concepts of the Christian church are evident in the *mappaemundi*. Sometimes the whole map is presented as a symbol of Christian truths. The central theme is the earth as a stage for a sequence of divinely planned historical events from the creation of the world, through its salvation by Jesus Christ, to the Last Judgment, interpretations that bears out von den Brincken’s view that the maps are as much historical chronicles as geographical inventories.

In such maps, the creation of the world is symbolized by the way the tripartite schema is used to divide the earth into the three continents as peopled by the sons of Noah. The three-part structure is thus a symbol of the historical beginning of man’s life on earth. With varying amounts of detail, the families of Shem, Ham, and Japheth are depicted on individual maps according to their biblical listing in *Genesis*, Shem’s family having the largest share (Asia) to reflect his primogeniture. The Semitic, Hamitic, and Japhetic peoples derive from this division.



T-O Map with Tau Cross.

Such images reinforce the symbolization of the Passion of Christ that is inherent within the T-O schema, the T-O representing the tau cross (crux commissa).

Diameter of the original: 16.2 cm.

From an 11th century manuscript of Sallust, De bello Jugurthino.

But the T-O map can also be seen as a symbol of the Passion of Christ. It is probable that the “T” in the T-O schemata represented a cross, but of the *tau* variety (the *crux commissa*). This is particularly noticeable when the ends of the crossbar are angled or truncated, as seen in the previous illustration. When the body of Christ is superimposed on the map of the earth in an all-embracing dying gesture, as in the *Ebstorf* map, the map itself becomes a clear symbol of the salvation of the world. Even the twenty-four monstrous races are embraced by the arms of Christ, although symbolically they are by his left hand at the very extremity of the world.

The inclusion of “Christ in Glory” at the head of several *mappaemundi* demonstrates the third symbolic stage of Christian history, that of the Last Judgment. The figures of Christ or of God the Father may be surrounded by a *mandorla*, an aura of light used to symbolize holiness and common in Christian art from the fifth century until the Renaissance. The almond shape of Higden’s maps (#232) and of the Genoese world map of 1457 (#248) is thus probably no accident. It reflects the use of this widespread symbol to denote the entire world as the domain of Christ. A *mappamundi* could thus represent simultaneously the complete history of the Christian world: its creation, salvation, and final judgment. Such a powerful message would not have gone unnoticed by those who saw either the small maps in monastic texts or the great wall maps that hung in churches and palaces, no longer surviving but to which we possess many allusions.

A special example of the spatial significance of a religious symbol lies in the association of the cross with the four cardinal directions, most commonly seen in the cruciform plan of churches, with the apse and altar in the east. The symbolism of the number four in Christian literature has its roots in classical times, as is illustrated by a diagram from Bede’s *De natura rerum*. The relationship between the four cardinal directions, the four seasons, and the four climates demonstrated by Bede goes back to Aristotelian thought. In this, the close relation between man and the heavens, the root of astrology, was also shown by the correspondence of the four peripatetic elements: fire, water, air, and earth, with the four humors of the human body, itself a microcosm of the universe. Isidore of Seville (#205) presented a similar diagram of the elements and their relation to the cardinal directions and climates.

The most specific allusion to the importance of such symbolism is given by Hugh of Saint Victor. Hugh’s *On the Mystical Noah’s Ark* not only provides us with an all too rare account of the making of a *mappamundi*, but also shows how the symbolic meanings were deliberately incorporated:

The perfect ark is circumscribed with an oblong circle, which touches each of its corners, and the space the circumference includes represents the earth. In this space, a world map is depicted in this relationship between the earth and the universe is well illustrated, for extra fashion: the front of the ark faces the east, and the rear faces the west.... In the apex to the east formed between the circle and the head of the ark is paradise. . . . In the other apex, which juts out to the west, is the Last Judgment, with the chosen to the right and the reprobates to the left. In the northern corner of this apex is hell, where the damned are thrown with the apostate spirits. Around this above-mentioned circle is drawn one a little wider so that the zones may be effectively seen; the atmosphere is in this space. In this second space, the four parts of the earth and the four seasons are represented:

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spring to the east, summer to the south, autumn to the west, and winter to the north.

The significance of the number four went beyond the physical characteristics of the earth and heaven. By their evangelistic association with the four corners of the earth in the Book of Revelation, the authors of the four Gospels are often shown in the northeast, southeast, southwest, and northwest corners of the world as in the *Leardo* map of 1452 (#242). Since the time of Irenaeus, bishop of Lyons (ca. 180 A.D.), each was associated with one of the four winged creatures in Revelation.

Even the orientation of the *mappamundi* has a symbolic meaning. The term “orientation” itself comes from primitive societies’ preoccupation with the east as a primary means of ordering space. The prominence of the four cardinal directions on the *mappaemundi*, together with appropriate symbolic wind heads, thus undoubtedly has a far deeper significance than simply showing the reader which way the map is to be read. The maps are found oriented in all four directions, but east, north, and south are the most common, in that order. An eastern orientation is usually, but by no means exclusively, found on the tripartite *mappaemundi*, and it follows the late Roman Sallustian tradition adopted by the Christian world. The northern orientation is found on the other large group of *mappaemundi* that can be traced back to earlier classical Greek sources and whose geometry was centered on the earth’s axis and the *climata*. The southern orientation is probably derived from Arabic influence, since world maps of the Arabic culture were characteristically oriented to the south. There may be two reasons for this. First, the early people conquered by the Arabs were the Zoroastrians, for whom south was sacred. Second, since the early cultural centers were in this newly conquered territory, north of Mecca, the holy direction toward which all Muslims prayed became south.

The cardinal directions thus not only were an abstract means of orientation, but also became mythical entities in their own right. As is well documented, the position of the sunrise, followed by that of the sunset, is the object of a deeply rooted human curiosity. It has been observed that the directions east and west tend to be named in early languages before north and south. Of the two, words for east commonly precede those for west. The importance of east in social and religious practice is also shown in the origin of the words of many languages for the cardinal directions. For example, “north” was described by its position to the “left” of east, and it thus became associated with sinister behavior, left-handedness, and evil. In Celtic languages, the words for “north” and “left” are closely related.

Mappaemundi also became symbols of royal and imperial power, thus reflecting the secular influences behind their creation. The orb and scepter were accepted regalia in representations of royalty, not only in ceremony and art but also on coins of the realm. Some of the earliest extant pictures of the tripartite and spherical earth are found on coins; the tradition started on Roman coins in the first century B.C. with a gold medal bearing on its reverse three circles representing the tripartite world. This is particularly significant considering the paucity of other references to the knowledge of the sphericity of the earth in Roman times. This symbolic incorporation of the world map or globe as an item of regalia continued throughout the Middle Ages. It was extended to paintings of God reigning in glory, depicted holding an orb surmounted

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by a cross in, usually, the left hand.

Another symbolic theme in the *mappaemundi* is the representation of the earth as a scene of vain pursuits. The *vanitas* symbol, as art historians call it, has been well documented for the post-Renaissance period, but its sources date from much earlier. The allegory of the goddess Fortuna with a wheel or standing on a globe is found on Roman coins. In the medieval period, Fortuna's wheel was combined with a world map on the 12th century floor mosaic now in the Museo Cívico, Turin. Here the central circle is an allegory of Fortuna's wheel, while the imagery around the edge is clearly intended to be cartographic. Henry III's decoration of the hall in Winchester castle included both a world map (1236) and a wheel of fortune (1239). A poem by Baudri de Bourgueil (ca. 1100) refers to a *mappamundi* on the floor of the chamber of Adela, countess of Blois, probably also intended as a *vanitas* symbol. Nothing of this has survived, but the map was described in such detail by Baudri that it is unlikely it was a product of mere imagination: he even refers to a glass top placed on it to seal out the dust.

Mappaemundi could also reflect the two main ways the individual was considered in the Middle Ages to be related to the universe. Both the microcosmic and the anthropocentric concepts were pervasive themes in medieval cosmological thought. According to the microcosmic theme, the human body was viewed as an epitome of the universe, in which the elements, humors, and organs of the body (the microcosm) were directly related to and controlled by the universe (the macrocosm). It was the central purpose of astrology to explain these connections.

Mappaemundi were themselves graphic epitomes of the earth, and the physical apple, in the Isidorian diagrams (#205). Other diagrams show the human body in a mandorla-shaped framework surrounded by graduations of the zodiac or the earth as one of four concentric circles representing the elements. *Mappaemundi* thus belong to a much wider family of spatial representations and ideas found in architecture as well as in cartography. Byzantine churches were often laid out with their main doors facing east, and later in the Middle Ages, particularly in northern Europe, the buildings were so oriented that the congregation faced the altar in the east. A dome, representing the heavens above the four directions of the earth, was often built above the intersection of the transepts and nave. In this way the building expressed the same symbolic spatial concepts as the *mappamundi*, a microcosm of earth and heaven.

The second concept, the anthropocentric, placed the individual in the center of an abstract geometric system of cardinal directions or in relation to some prominent feature in the landscape, such as a river. This was a natural world view in those societies where livelihood depended largely on the immediate visible environment and in which the daily and seasonal positions of the sun, moon, and stars were strong orienting influences. During the Middle Ages, however, man was not at the center of the world. The idea of the City of Man, at least in medieval Europe, as opposed to Augustine's City of God, was to await the European Renaissance. If anything was depicted at the center of the *mappaemundi*, it was not the monastic centers where the maps were made but the symbolic biblical centers, such as Jerusalem or Mount Sinai, or classical centers such as the sacred isle of Delos or Rome. For the Christian, there was clear biblical justification for centering maps on Jerusalem. There was also a sensitive awareness of space in the *Old Testament* that gave location an integral role in the events of Jewish history.

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Adamnan, abbot of Iona, in his *De locis sanctis*, speaks of: *a very high column which stands in the center of the city.... It is remarkable how this column . . . fails to cast a shadow at midday during the summer solstice, when the sun reaches the center of the heavens. . . And so this column. . . proves Jerusalem to be at the center of the world . . . and its navel.*

Such an observation of the sun is impossible astronomically (unless the column was leaning ten degrees toward the south), Jerusalem being some ten degrees north of the Tropic of Cancer. However, the attempt to prove a traditional concept with a scientific observation reflects the newfound respectability of science. Such scientific precision was also found in the description of Bernard the Wise (ca. 870), who reported that the walls of the four main churches in Jerusalem enclosed an unroofed porch, over which four chains were strung from each church to join in a point over the center of the world.

Despite such beliefs, Jerusalem was not shown as the center of most medieval *mappaemundi*. This is apparent in those maps not in the diagrammatic T-O category, such as Beatus, Orosius, or Higden, or important 12th century maps like that by Henry of Mainz (*the Sawley map*, #215). It is true that three particularly well known *mappaemundi*: the *Ebstorf*, *Hereford*, and *Psalter* maps (#224, #226, #223), are all precisely centered on Jerusalem, and it is this that has perhaps led historians and geographers to over-generalize. It has also been wrongly assumed that, since the T in the schematic T-O maps represents the meeting of the Mediterranean with the Don-Black Sea-Aegean-Nile axis, the Holy Land is near enough that intersection for Jerusalem to be at the center of the map. But there are not only many examples of where intersection of the stem and the crossbar of the T is far above the center, but also many where Jerusalem is placed at some distance from this intersection.

Thus, while there is a clear biblical justification for centering these maps on Jerusalem and an empirical reason for doing so (it did occur roughly in the middle of the then known world), the idea does not seem to have been taken as literally as was previously thought. One reason for not centering maps on Jerusalem derives from the original use, not of a Christian model, but of a Greco-Roman one in the *mappaemundi*, which was perpetuated through the *Orosian* tradition. The strengthening of the idea of Jerusalem as the spiritual center, a natural outcome of the Crusades, may have been responsible for a noticeable shift in the structure of *mappaemundi* from 1100 to 1300, toward centering the maps on Jerusalem. Although many pilgrimages to the Holy Land had taken place in early medieval times, owing to the efforts of Saint Helena, a number took place in the fourth century, it was only after the Crusades that widespread popular attention was focused on the central position of Jerusalem. The trend toward centralization is seen when we compare the world map of Henry of Mainz/*Sawley* (ca. 1110, #215) with the *Hereford* map (ca. 1290, #226), at either end of this period. This characteristic has been used to date the *Vercelli* map (#220.2), which is not centered on Jerusalem, early in the 13th century, in contrast to the later *Hereford* and *Ebstorf* maps (both of which are so centered). By the 14th and 15th centuries, the practice of placing Jerusalem at the center became common, but this was by no means true for the entire medieval period, or even most of it.

The 14th century witnessed several profoundly important developments in expectations about the content of maps, in the uses of maps and other representations of territory in

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administrative settings, and in broader attitudes toward space and its representation. Many of these changes are first apparent in Italy, but there are signs of their impact on other parts of Europe as well. In some cases the changes lie primarily in the number and increasingly widespread use of certain map types, like local maps, which began in this period to be made in increasingly large numbers and in some other parts of Europe outside England. Other developments have been traced in users' attitudes toward their maps, especially concerning the authority of geographical information. Although tidy chronological divisions are obviously artificial, there were enough changes and developments in European cartography in the 14th century to make it worthwhile to give this period special attention.

The best known to modern scholarship of "transitional maps", although still too little studied, were the hybrid map forms that combined the representation of the Mediterranean coastlines derived from *portolan* charts (#250.1), with the image of the world as a whole of the *mappaemundi*. These transitional maps are important evidence of the process of change in the geographical worldview. Clearly a map was still expected to portray the overall structure of the known world, while the adoption of the image of the Mediterranean and Black seas from the *portolan* charts shows that the makers of these maps had an appreciation for the spatial accuracy offered by these newer cartographic forms. These images further suggest that the two map forms were in no way considered incompatible. Rather, in the same way that the various types of world map were understood as aspects of a larger whole, *portolan* charts and world maps were seen as coordinating views of the same reality.

We do not yet fully appreciate the range of small, but incremental, changes in multiple areas of endeavor— astronomy, mathematics, philosophy, art practice and organization, jurisdiction and law, rhetoric, and mercantile life, to name only a few — that led at least some Europeans of the late 15th century to represent their world (whether actively as mapmakers or passively as consumers of maps) in a way that emphasized the uniformity of physical space. It is a grave mistake to think that other views of the world disappeared: T-O maps remained, as convenient for the printer as they had been for the scribe, and the familiar circular form of the "medieval" world map persisted as an appropriate framework for representations of various sections or details of the world. The *portolan* chart (#250.1), of course, continued its reign as the most accurate known type of map, lapsing into the steady-state conservatism of a fully successful technology, but remaining at the center of a vigorous trade until the 16th century. From hindsight, we know that the future of European cartography lay elsewhere: but the 15th century must have appeared to contemporary eyes — at least to selected and well-placed contemporaries — as primarily a period of proliferation, of both map types and individual copies of maps.

From a Europe-wide perspective, maps had already begun to appear in a host of different contexts and circumstances, providing help in governing, litigating, and navigating. Regionally, of course, the view would depend on where you stood: in England, northern Italy, and Holland maps would have been quite common, while they were less so in Spain or southern France. These regional distinctions, their causes, and the reasons behind their eventual decline as limiting factors on the knowledge and use of maps in daily practical and intellectual life will be the

subjects of later chapters. Here we should conclude by looking backward to the rich and complex world of late medieval cartography, to its growing ability to seem relevant to a host of projects and societal needs and to capture the imaginations of a range of people.

As Cattaneo puts it, during this period different perceptions and discursive traditions pertaining to the concept of space were at the onset of affirming the systematic use of cartography as a means for the construction of territorial relations and their representation. By conflating the classical geography of the ancient authors with the testimonies of the moderns (sea charts, *mappaemundi*, *portolani*) from the beginning of the 13th century a process began that, by placing geography at the service of universal history and commerce, led to the affirmation of cartography as an effective medium of representing and constructing space.

The scientific status of universal cartography before the early modern period was marked by theoretical reflections on the functions of representational cartography of two medieval authors, Hugh of St Victor (c. 1096-1141) and Fra Paolino Veneto (c. 1270-1344).

Hugh of St Victor shows clearly in the foreword of one of his long forgotten works, the *Descriptio mappe mundi* — the description and commentary of a large circular map of the world found in this abbey — how the pictorial representation of the *imago mundi* had already been transformed during the 12th century into an independent and legitimate form of cultural expression, itself becoming the object of semiotic analysis and commentary:

Therefore we have proposed in this work not to depict but to describe the map of the world, that is to say not things or the images of things, but rather the meanings, we wish to show not what the things themselves signify but by what they are signified.

According to Hugh of St Victor, cartography should have aroused the interest of all “wise men, both seculars and those learned in ecclesiastical writings” as a way of attaining a better understanding of the story of Salvation through representations of specific places on Earth. Thus, the European *mappaemundi* were to serve a primarily educational purpose. It is important to bear in mind that these reflections on universal cartography complemented the famous description of navigation formulated by Hugh of Saint Victor in his most celebrated work, the *Didascalicon*.

A century later Fra Paolino Veneto, author of three well known universal chronicles (the *Epitoma*, the *Chronologia Magna*, also known as the *Compendium*, and the *Satyrical Historia*), developed an important observation on the function and the status of universal cartography in a treatise titled *De mapa mundi*. Heir to a tradition steeped in classical culture, which upheld the need to obtain knowledge of geography as a prerequisite for understanding human history, Fra Paolino attributed a specific educational and edifying role to world maps conceived as pictorial representations of the *mundus*, the universe created by God, combining ‘writing’ with ‘images.’

The process of acquaintance with and the broadening of the *imago mundi* that medieval culture inherited from Antiquity was set in motion between the 12th and 13th centuries and the beginning of European expansion in the 14th century. The specifically Renaissance contributions to cosmography consist of associating systems of cartographic and geographic knowledge in a new way, defined at the beginning of the 12th century in the light of literary and geographic discoveries that already became a reality as early as the thirteenth century.

Non-European Cartography

The history of scientific geography and cartography is usually perceived and presented as containing an unaccountable gap between the time of Ptolemy (2nd century A.D.) and about A.D.1400. Most older standard works on the subject seem restricted to certain conventions as to the participation of China; there are discussions of medieval European knowledge of China, what the Arabs said about it, and the stimulus of the visits made by the merchants and the religious-diplomatic envoys in the 13th century A.D., but rarely any in-depth discussion of Chinese cartography itself (Needham, Smith and Chavannes have the most detailed discussion found to date, along with the latest *History of Cartography, Volume Two*). Yet during the whole of the millennium when scientific cartography was unknown (and/or unused) to Europeans, the Chinese were steadily developing a tradition of their own, not strictly astronomical, but as quantitative and exact as they could make it. An essential point to be made is that, just as the scientific cartography of the Greeks was disappearing from the European scene, the same science in different form began to be more intensely cultivated among the Chinese. A tradition that began in earnest with the work of Chang Hêng (A.D. 78-139) and one that was to continue, without interruption, down to the coming of the Jesuits in the 17th century.

However, like Europe, Chinese cartography that was heavily influence by religious cosmography also co-existed alongside scientific cartography in China. Acquaintance with the far west and the discovery of a safe route to India brought Buddhism to China. Like Taoism before it, and Jainism, which developed along with it, Buddhism influenced Chinese cosmogony and cartography: the earth was represented as a disc centered on *Mount Meru* and entirely surrounded by ocean. However, later Indian geographers no longer placed this mountain at the center of the world, as befitted their growing knowledge of geography, which now included the Oxus region (Amu Darya) and China. This Indian influence is visible in only a few surviving Chinese maps, chiefly those in texts originally Indian. During the T'ang Dynasty (A.D. 618-907) a fresh impetus was given to Chinese cartography by the expansion of the kingdom of China to *Tarbagatoï* in the north and the Indus in the south. A new description of these western lands, in 60 volumes, was completed in 658; according to the text of some surviving volumes, maps were originally appended to them. There are references to maps of the "western lands" in 747 and later. This Asian "medieval" period culminated in the work of Chia Tan, a scholar who began in 793 to compile a description of ten provinces and to prepare maps and itineraries for it. It took him six years to make a map of the whole country, measuring 10 by 11 meters and including the adjacent parts of Central Asia. At about the same time another geographer, Li Chi-fu (758-814), composed a description of the fortified towns of China, on 54 scrolls, and made a map showing strategic points north of the Yellow River. None of these maps has survived.

The two oldest known existing maps from China were found in the *Forest of Tablets* at Hsiaifu, the capital of Shensi province, in the far interior (#218 and #218.1). They are engraved on stone tablets in this "forest", which is a collection of most valuable and ancient monuments gathered together in that city. These two maps were cut in stone in 1137 and measure 80 cm high and 77 cm broad. One shows China alone, divided into squares of 100 *li* and the other, though ambitiously entitled *Map of China and the Lands of the Barbarians*, does not extend very far

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beyond the borders of China: it includes part of Korea in the north and part of the Pamir plateau in the west. However, on the borders of this map there are lists of all known “barbarian countries”, and these make it more than just a map of China, though by no means a world map. The maps are engraved with the year called *Fou Ch’ang*, which Chavannes estimates to be A.D. 1137.

The culmination of indigenous Chinese cartography is found in the contributions of Chu Ssu-Pen (#227) and his successors who, beginning in the Mongol Yuan Dynasty, established a mapping tradition that provided the basis of China’s cartographic knowledge which was not seriously challenged until the early 19th century. The Mongol conquests, besides promoting the unification of Asia and extending its sphere of influence as far as the boundaries of Europe, also combined growing commercial and intellectual contacts with Persians and Arabs to bring to China a wave of fresh information about the countries beyond its borders. The Mongols, however, did introduce a characteristic feature into cartography: most maps of this period are oriented with north to the foot. This suggests the influence of astronomers, and indeed during the Mongol Dynasty (1260-1368) longitudes were determined by the astronomer Kuo-shen. Taking advantage of the resultant explosion of geographic knowledge brought about by the Mongol invasion, Chu Ssu-Pen (1273-1337) built upon a scientific cartographic heritage that extended back to the astronomer Chang Hêng (a contemporary of Ptolemy) and the famous P’ei Hsiu (Chin Dynasty, third century A.D.). Chu synthesized and collated the work of his predecessors with new knowledge acquired through both personal travel and the increased contact with the West to produce, between 1311 and 1320, a large roll-map of China and the surrounding regions.

It should be mentioned that, at least by the time of Chu Ssu-Pen, the Chinese cartographers knew principles of geometry and possessed instruments that would greatly facilitate their mapping activities. The instruments included the *gnomon*, and a device similar to the *groma* of the Romans, with plumb lines attached. The Chinese also used sighting tubes and something akin to the European cross-staff for estimating height, as well as poles for leveling and chains and rope for ground measurement. The odometer or carriage-measuring instrument, by which distance is ascertained by the revolutions of the wheels, is referred to in China at least as early as in Europe. Compass bearings, implying the use of the magnetic needle, seems to have been made by the 11th century A.D.; it is assumed that the magnetic needle was transmitted westward to Europe shortly after this period. About 1311-1312 Chu Ssu-pen composed an atlas of provincial maps (*Kuang Yü T’u*, #227); this later served the Jesuit Martino Martini as the basis for his *Atlas Sinensis*, printed at Amsterdam in 1655 and included as a separate volume in the *Geographia Blaviana*. Sea charts had long been used in China alongside land maps, and the familiarity of Chinese seamen with distant Asian harbors was noted by Marco Polo. Two of the provinces described by him, *Ania* and *Toloman*, are taken to be the northeastern point of Asia and the coast of Alaska, and the *Gulf of Anian* to be the present Bering Strait. The name *Anian* is probably *Aniva*, which is Japanese for the strait separating the island of Sakhalin from the mainland. The Chinese in fact knew the coasts to the northeast as far as Sakhalin, and possibly even further; and later European missionaries were to use the old Chinese maps of Sakhalin. The routes to the south and west were equally well known in China. Between 1402 and 1433 seven large

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naval expeditions dispatched by the Ming emperors and led by Zheng He visited the Malay Archipelago and the Indian Ocean. One expedition went as far as the Red Sea, and an envoy went on from there to Mecca. At the same time, Ma-huan compiled a chart of the voyage. It is said that this was greatly influenced by Arab sea charts, but this cannot be verified because no Arab sea charts have survived. Ma-huan's sea chart in its turn influenced later maps, such as those of Mao K'un, who wrote a long treatise, *The Necessity of Coastal Defense* in 1562, containing many maps. Mao K'un's chart displayed the whole of the coastal region from Amoy to the Strait of Ormuz, at the entrance to the Persian Gulf. By this time there was also a similar coastal chart of China itself, i.e., the region north of Amoy.

The Ming Dynasty (1366-1644) produced a number of maps, chiefly to accompany travelogues, encyclopedias and other books. There were general maps too, without descriptive texts. When the former state archives were handed over to the National Library in Beijing in recent times several maps from this epoch came to light: sixteen hand-painted, and two large printed ones (in 11 and 32 sheets respectively). There are also maps of this period in other collections, one of the most famous being by the noted astronomer and astrologer Chou Ssu-pen.

More than eighty years before the Portuguese voyages of Vasco da Gama (1497-99) and Cabral (1500-01), and Columbus' voyages (1492), the admiral Zheng He began leading expeditions of ships from China through the Indian Ocean to as far as the eastern coast of Africa - this at a time when European ships had yet to round the southern tip of that continent. The longest of Zheng's voyages spanning more than 9,600 kilometers (5,965 miles) each way, about one and one half times the length of Columbus' trips across the Atlantic. Such long distance journeys were not unusual in Chinese history. In the second century B.C., the general Zhang Qian was dispatched on a diplomatic mission westward to the Yuezhi people and reached as far as Afghanistan. In succeeding centuries, Chinese writers produced a vast corpus of geographic literature, from accounts of foreign lands to descriptions of the entire empire to gazetteers of particular localities. As Joseph Needham pointed out more than sixty years ago in volume 3 of his *Science and Civilisation in China* (1954), the geographic records in the dynastic histories and Chinese geographic literature would not have been possible without the accumulated observations of countless travelers and explorers.

Much of the literature on Chinese geography since Needham began his seminal work on the history of Chinese science have tried to make it resemble that of the West. This is perhaps nowhere so true as for the subject of Chinese mapmaking. It can be and has been written that Chinese cartography was a science that strove, for mathematical accuracy. Insofar as it was a mathematical science, it was eventually surpassed by that of the West, but not until the 15th century or so. Until that time, the quantitative tradition is said to have been stronger in China.

The Chinese cartographic historian Cordell D.K. Yee states that there is no denying the meticulousness with which imperial China gathered geographic information about its own territories and contiguous areas. There is also no denying that the Chinese had by at least the 12th century laid the foundations for a mathematical cartography-one predicated on the belief that geographic knowledge depended on the ability to measure the earth. From the universalist perspective, what kept traditional Chinese cartography from advancing as far as European

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cartography was a conception of the earth as essentially flat. A coordinate system similar to latitude and longitude thus could not develop, nor could techniques of projection for the transference of points on a spherical surface to a plane surface.

The imposition of modern Western ideas of what constitutes a map has hindered the understanding of the Chinese version by making traditional Chinese mapmakers resemble modern mapmakers, or lesser versions of them. They do not have to, and the evidence suggests that they ought not to. Their aims and were different from those of modern Western cartographers. In the history of cartography, at least, it may be time to restore the sense of “otherness” that once held sway in discourse about China. Traditional Chinese cartography was different from its modern European counterpart. It did more than its mathematical European counterpart in restoring this sense of “otherness”.

Korean maps are particularly interesting. Korea itself, a state founded by Chinese colonists, was rarely independent. First it was a Chinese satellite, then it achieved independence for a short time during the disorders in China and, after suffering Japanese invasions in the south, finally became subject to China again. Consequently, Korean literature, science and art were under Chinese or Japanese influence. Most Korean cartography, therefore was not “original”, but followed Chinese methods. A special type of atlas was, however, developed in Korea, usually consisting of the following maps: a world map, a map of Korea, with its eight provinces, and one map each of China, Japan and the Ryukyu Islands. The number and order of maps varied, but these atlases generally had the same contents. Once they were to be had in every Korean antique shop, but recently they have become scarcer. The world map is a relic of very early times, and appears in two main types: one Chinese, based on the already mentioned description of the world by Shan-hai-ching (fourth century B. C.), and one brought to China from India in the seventh century by the Buddhist Hiuen-tchoang. The influence of Shan-hai-ching’s cosmography can be seen in the text on the maps: the maps show a piece of land at the center surrounded by another, ring-shaped, piece, which is inhabited by various mythical peoples and animals with names coinciding exactly with those in the cosmography (#231). Here again we may observe the similarity of many of these mythical creatures to those shown on mediaeval European maps. The Korean maps naturally underwent changes, chiefly between the 13th and 16th centuries.

The world map of the Buddhist type is characteristically called not a world map, but a map of the Indian lands, and in consequence European scholars have taken it for a map of India. There are also maps of mixed type and maps showing Japanese influence. The majority of atlases are in manuscript, though a few are printed from wooden blocks; the latter are more highly prized in the East than the manuscripts, because printing seemed a luxury beside the cheap labor of copying.

Japanese cartography developed quite independently. The earliest references to maps occur in an imperial decree, quoted in one of the chronicles (A.D. 646), ordering that frontiers be inspected, all regions described, and maps of them compiled. Strictly speaking, this decree ordered the making of cadastral plans rather than terrestrial or world maps. Amongst further references to mapmaking, one from the year A.D. 738 mentions quite definitely the publication of

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provincial maps - *Kokugunzu*. At about this time a general map of Japan was made, commissioned by Gyōgi Bosatsu (670-749), if not actually made by him; he was a Korean by birth, went to Japan as a Buddhist missionary, and did much educational work there. The map is not preserved, but later copies of it are to be found in one of the 15th century encyclopedias. The oldest surviving map is that of Japan in the Ninnaji temple near Kyoto, dated 1305, though it is a copy of an earlier (eighth - ninth century) map; this belongs to the *Gyōgi*-type mentioned above. Maps of this type continued to appear almost to the end of the 17th century, and they influenced Korean, Chinese and even European maps.

India, Sīnd-Hīnd to the Arabs, *Mount Meru* to the Chinese, exercised through its cosmogony a deep influence on other countries, but was itself originally under the influence of Babylon. While part of the intensely pragmatic Babylon, however, philosophy was the sole province of scholars and priests; in India theories of cosmogony spread from the temples to the common people, and any free development of empirical knowledge was inhibited by religious and caste-bound disputes. A further result was that India had no cartographic tradition to speak of. Of course man cannot do entirely without maps, and some kind of representations similar to maps were presumably made, but these, drawn on palm-fiber paper, must either have worn out with use, or are preserved to this day in temple archives inaccessible to outside scholars. We do know that Indian seamen had maps and pilot-books; the Turkish cartographer Seīdi Ali used some, for example, and so did the Portuguese on their first voyages in Indian waters, as shown by the fact that the earliest Portuguese maps contain information about the countries of the east that they could not otherwise have acquired.

All that remain today however are generalized cosmogonic pictures derived from the theory that the world consists of countless spherical separate worlds. Our earth is one of the concentric rings in a disc detached from a globe, and all or part of the ring is inhabited. At the center is *Mount Maga Meru*, from which flow all rivers. The lists of peoples, cities and countries are pure invention, like later European maps of imaginary countries such as *Cockaigne*. There is a Buddhist map showing the world as a floating lotus-blossom, whose petals, stamens and pistils are covered with the names of countries, rivers, and so on, most of them invented. No one in India seems to have been interested in cartography, though we can surely assume the existence of other maps which answered the real needs of the people in conditions apparently favorable, notably the Indians' remarkable sense of direction. Maps of native origin were brought to Europe from Burma and Nepal, but these were products of European influence, and any native character they may seem to have is due to their artists' unfamiliarity with the pencils and paper provided by Europeans who may have been actually directing their work. India was long a closed country, and even if she did permit foreigners to enter, she herself did not trade with other countries. Indian religion (i.e., non-Moslem religion) did not permit the people to leave their country. Thus Indian geographers knew little about foreign countries, and the Brahman or Jain cosmographies are full of imaginary peoples and lands.

Maps from Siam, Cambodia and the Malay Archipelago are also unknown to outside scholars. Such maps must have existed, however: Affonso d'Albuquerque, governor of India, wrote to the King of Portugal in 1512 that he was sending him a copy of a large map made by a

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Javanese pilot, showing the Indian Ocean from the Cape of Good Hope, with the Red Sea, the Persian Gulf, the Moluccas, and the sea-routes to China and Formosa, as well as land routes in the interior. The Javanese were experienced sailors: in 1513 the King of Djapara alone had a fleet of 80 warships. Unfortunately, nothing is known of their maps, and there is little hope that anything will ever be discovered, because the palm-leaves from which they were made are not very durable.

Having already mentioned the influence of Arab and Persian maps on both European and Asian cartography, it remains to be said that Persian cartography, at first wholly under Arab influence, seems to have ceased altogether, at least in the production of land maps, with the decline of Arab power. Only one Persian map is known, and even that is not the original work, but merely an English translation. The original is now lost, and it is not easy to trace its genesis. It seems most likely that the map was made somewhere in northern India or in a Persian border province, by a Mohammedan who used the Persian language, and possibly Arabic as well, and portrayed chiefly India and its northern parts. All the other countries receive schematic treatment: *Abyssinia* [Africa] in the west, China in the east, Bokhara and Kashgar in the north, and beyond them *Gog* and *Magog*. Europe is mentioned incidentally as *Farang*. Nautical cartography in southwest Asia, however, developed independently as a practical science, as it did in Europe, but no examples are known to survive. Early European travelers often praised the skill of Arab pilots; in 1444 Nicolo de' Conti reported that they knew the heavens well and could navigate by the stars. In Malinde on the East African coast, in 1498, Vasco da Gama engaged a Moslem pilot, Ibn Majid of Gujarat, for the voyage to Malabar. This pilot, experienced in navigation of the Indian Ocean, for which he had written sailing directions, showed Vasco da Gama a chart of the Indian coasts; the Portuguese noted that it was divided by meridians and parallels drawn at right angles but lacked the familiar rhumb lines. Seidi Ali, in composing his *Indian Mirror of the Sea* in 1554, made use of the books and charts of Arab pilots. As the heir of both Arab and Byzantine cultures, the Turkish Empire had a rich cartographic tradition behind it. The first known product of Turkish cartography, dating from the time when the Turks were still in Central Asia, is an unusual and original circular world map included by Mahmud al-Kashgari in his Turkish dictionary of 1074 (#218). During their subsequent migrations in face of Mongolian expansion the Turks acquired the nomadic cast of mind and lost all interest in science. Only when they had settled down in Asia Minor did they return to literature and science, now following Greek models. Mohammed II, who conquered Constantinople, surrounded himself with a retinue of scholars and artists charged to protect the works of art and antiquities of Byzantium; among these Byzantine doctors, philosophers, astrologers and mathematicians was Georgios Amirutzes. Mahommed's interest centered on Ptolemy's *Geographia*, and as the manuscript of it found in his library contained no world maps, Georgios had to make one in Greek and Arabic, which Mahommed ordered to be woven into a large carpet. He subsequently commissioned Georgios and his son to translate the text of the *Geographia* into Arabic. When he heard that there were good Latin translations available in Italy (Jacopo d'Angiolo, 1406), he acquired one for himself, apparently a copy made by Francesco di Lapacino of Florence about 1450. Francesco Berlinghieri, aware of Mahommed's esteem for the works of Ptolemy, later presented him with his

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newly-printed version of the *Geographia* (1482) with an autograph dedication. The manuscripts of Ptolemy's *Geographia* mentioned above are preserved to this day in the Seraglio Library at Istanbul, but Georgios' world map has never been traced.

This library also has fragments of an interesting 14th century Catalan map and a few Italian sea-charts, including Cristoforo Buondelmonte's *Isolario* of the Greek Archipelago, an atlas of 12 charts by Grazioso Benincasa from the second half of the 15th century, and some of later date. Their presence in the library is not accidental, as they must have supplied material for the work of the famous Turkish sailor and nautical cartographer Piri Re'is, as we can guess from the preservation of his maps also in the same collection (#322). Some of his sea-atlases (which he called *Bahriye*) are based on foreign charts. The atlas, which he presented to the Sultan Selim in 1521, contained charts of the coasts and islands of the Mediterranean and the Black Sea, with a description of these seas. In 1526, he prepared a second and fuller guide to navigation. In the preface to this work the author reveals that, some time before, he had drawn a map of the Indian Ocean and China Sea based on the most recent discoveries. This is what he says about it: *This poor man has already constructed a map containing many times more detail than earlier maps; he has even inserted the newly received charts of the Indian Ocean and China Sea, known to no one in the land of Rum, and presented it to the Sublime Porte in Cairo . . .*

Part of a manuscript sea-chart of the Atlantic Ocean with the coasts of Africa and America was discovered in 1935 in the Seraglio Library. This bears the information that it was drawn by Piri Re'is in April 1513 and that the western part, the coast of America, was copied from Columbus' map, which the uncle of Piri Re'is had acquired from a Spanish slave who had taken part in three of Columbus' voyages. This fragment is thus doubly precious, as part of a Turkish map by the great Piri Re'is, and as a copy of one of Columbus' own maps. More recently, a fragment of another map drawn in 1528-29 has been found. This fragment also covers the western part of the Atlantic. It shows all the discoveries of the foregoing 15 years (1512-27) known to Istanbul. It is interesting to note that, according to Turkish sources of the time of Bayazid (1481-1512) is white Frank named Colon came to Istanbul and said: *Give me some ships, and I will find a new world for you*, but that the court considered this proposal to be pure fantasy and turned it down.

At this time Turkey was building up her power at sea, and cartography was deliberately cultivated to this end. In his manual of navigation in the Mediterranean (*Bohnye*), Piri Re'is gave detailed information about everything necessary for sailing and equipping ships; and he described maps thus: *A map is a skin, on which the shape of the sea and the winds are drawn*. Turkey maintained fleets in the Red Sea and the Persian Gulf as well as the Mediterranean. In 1538, when a large fleet was sent from the Red Sea to India to drive out the Portuguese, the cartographer Seidi 'Ali was commissioned to prepare a navigational guide for it. The fleet did not fulfill its mission, but Seidi 'Ali completed his *Mohit* [Indian Mirror of the Sea] 1554. He tells us that he based his work on the experiences of pilots from Ormuz and Hindustan, and pilots' books and sailing directions from pre-Portuguese times; he also knew the latest maps and discoveries, such as that of the Straits of Magellan. His book, only the text of which survives without maps, deals with the African coast as far as 27 degrees South and extends in the east to Cambodia and

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the Moluccas. Seïdi 'Ali also produced a *Mîrat el-memalik* [Mirror of Countries].

Muhammad ibn Battuta is one of the greatest travelers of all time. For nearly thirty years he wandered the Islamic world, an estimated 120,000 kilometers [75,000 miles] through forty-four modern countries, meeting with the wise and the good and committing to memory all that he saw and did. Although more of a traveler than an explorer - it was only on his final journey that he ventured beyond the established commercial routes of *Dar al-Islam* - his narrative survives as one of the most substantial accounts of the 14th century world. A native of Tangier, Ibn Battuta set out in 1325 at the age of twenty-one to make the pilgrimage to the holy shrines of Mecca and Medina, not simply as a duty of faith but also to enhance, by contact with the famous scholars of the East, his suitability for judicial office. However, it was not long before he realized that intellectual fulfillment could not be satisfied by the *hajj* alone, but would require him to continue 'through the entire earth'.

Beyond Mecca, Ibn Battuta took a circuitous route through the classical lands of Islamic culture, then proceeded to the trading posts of the East African coast, South Arabia and the Persian Gulf. In 1332 he turned north to Asia Minor, crossed the Black Sea and examined the western khanates of the Mongol empire. An overland journey through Central Asia and Afghanistan brought him to India, where he remained for nine years before being sent in 1342 as the sultan's envoy to the Mongol emperor of China. This journey took him along the Malabar coast, to the Maldives, Ceylon/Sri Lanka, Bengal and Assam, then via Sumatra to the great Chinese port of Quanzhou. Returning to Syria and finding the country ravaged by plague, he promptly departed for North Africa and Spain, and in 1351 returned to his home country. Unable to settle until he had seen the last distant outpost of Islam, he set out across the Sahara to the kingdom of Mali, whose previous ruler, Mansa Musa, had passed in splendor through Egypt on a pilgrimage to Mecca. Via Timbuktu, a city that had yet to flourish, and after a second hazardous crossing of the Sahara, Ibn Battuta returned to Morocco in 1354, this time for good. Remarkably, his multi-volume narrative, dictated entirely from memory, languished unnoticed until its rediscovery by scholars 600 years later.

Sources

Surekha Davies, in an article entitled "The Wondrous East in the Renaissance Geographical Imagination: Marco Polo, Fra Mauro and Giovanni Battista Ramusio" (*History and Anthropology*, 2012) discusses how map-makers used both ancient and contemporary sources for their maps. The following are excerpts from that article. Cartographers and readers of travel writing have always faced the methodological problem of how to determine the credibility of their sources. During the Middle Ages and the Renaissance, European readers of accounts about far away places like the Far East and Africa encountered sources from a range of periods, produced by writers who were not always eyewitnesses even if they claimed that their sources were. These accounts included the works of classical authorities and medieval and 16th century travelers and writers. From classical antiquity to the Enlightenment, the distant these far away places were associated with wondrous beings in the European imagination. For late medieval Latin Christendom, the East was the site of, for example, the Great Khan, leader of the Mongol empire

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and the biblical *Gog* and *Magog*, supposedly imprisoned behind a wall by Alexander the Great, and prophesied to break out into the world at the Last Judgment. These tropes circulated via ancient and medieval texts such as Pliny's the Elder's *Historia naturalis* (c. 77 – 79 CE) and John Mandeville's book of his alleged travels. The distant East—often termed *India*—was sometimes conflated with a region called *Ethiopia* which was variously placed in Africa or Asia. What medieval conceptions of India and Ethiopia shared was proximity to the sun. From the 15th century, European oceanic exploration began to reveal hitherto unknown regions of the globe. Geographers now had the opportunity to compare long-established textual sources against new ones that fore-grounded the experience of contemporary travelers.

In practice, most information about distant places circulating in Late Medieval and Renaissance Europe had been shaped not only by travelers, but also by readers and by those who had heard the testimony of travelers. These agents included scribes, amanuenses, translators, illuminators, editors and, in the age of print, compositors and publishers. Thus, travel accounts were almost always mediated works, the result of interpretative, analytical and editorial processes that had inflected information provided by a traveler. What was to be included in a map or text had to be selected, and the material was articulated in a particular way in a finite space, within the conventions of the genre, and with an eye to the work's intended audience.

Since at least the 11th century, mapmakers have sometimes included brief references to the credibility of information and eyewitness sources. They give us brief glimpses into how mapmakers, as readers of travel accounts, evaluated the more wondrous aspects of travel writing. They also give us a point of departure for exploring what kinds of material mapmakers considered as being at the bounds of credibility, and the ways in which they participated in circulating such information. The *Catalan Atlas* of 1375 (#235), made by Cresques Abraham, a Majorcan Jewish cartographer, is an example. The map is the earliest surviving example to include large amounts of information derived from Marco Polo's *Divisament dou monde*. A caption in the Indian Ocean notes nearly 8,000 islands, which are so rich in "marvelous things" (*les maravellozes cosas*) that our mapmaker cannot describe them (*"no podem respondre assí"*). The local pearl fishers, in order to ward off man-eating fish (sharks) before diving, apparently recited magical incantations. If they should dive without first doing so, they would be eaten. Cresques Abraham added that "this is something that has been proved repeatedly": evidently, he assumed that the reader might find this incredible, but he himself felt that the number of proofs that had been offered (though he does not elaborate these) was grounds for believing it. Another type of reference by mapmakers to wonders is exemplified by a legend on the *Hereford mappamundi* (#226). This affirms that India contained "5,000 cities and peoples with extremely diverse, monstrous appearance, with unbelievably various ritual practice and dress". The mapmaker, while conceding that reports on the sheer variety of India's cultures might be difficult for his readers to believe, is prepared to declare that this is indeed what India contained. Captions such as these implicitly drew a distinction between what was truly unbelievable and what merely appeared to be so.

The 15th century was a transitional period in European geographical knowledge: many new sources of information about the Atlantic world began to circulate, while knowledge of Asia was still restricted to much older sources. In 1406, Ptolemy's *Geographia* was re-introduced to the

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Latin West, and with it, a system for representing space by means of latitude and longitude coordinates became widely known in humanist circles. From the early 15th century, Portuguese navigators regularly introduced new information about Africa and the Atlantic islands. When the fleet led by the Portuguese Vasco da Gama reached India in 1498, it augured the beginning of sustained seaborne voyages between Europe and the Far East. However, little in the way of new sources about Africa and Asia (derivative or otherwise) circulated between the early 14th and mid-16th centuries. The travels of Marco Polo, Odoric de Pordenone and John de Piano Carpini had long been available; John Mandeville's account, compiled around the 1350s, continued to circulate widely (this imaginatively combined elements from all of these and more).

The *Fra Mauro mappamundi* (#249), the most extensively annotated of surviving world maps produced before European oceanic voyages to Asia, appeared around 1448–1453. This map is covered in geographical text-captions, with a smaller number of illustrations. This map can be used as an example of how some map-makers in the Late Medieval period used both ancient and contemporary sources. A caption informs us that “this work [was] made for the contemplation of this most illustrious signoria [of Venice]”. The map appeared at a time when the geographical authority of the ancients was being questioned, but when little new information about Asia had appeared for nearly two centuries. What makes this map unusual is the sheer volume of captions devoted to evaluating its sources. Examining those passages that indicate belief, surprise, doubt or incredulity helps us to explore the principles of judgment that could be applied to the wondrousness of the non-European world by a 15th century Venetian mapmaker. It is clear from the map's captions that Fra Mauro had some awareness of humanist approaches to textual scholarship.

For Fra Mauro, the East contained many notable features (“*cosse notabile*”). He notes that certain ancient authors had shown that in India there are cities, castles and innumerable peoples of different varieties, standing and customs, powerful lords, a great number of elephants and a diversity of almost incredible monsters, both human and animal . . . horrible beasts . . . precious fruits, timber and herbs and roots with virtuous properties and a variety of gemstones...and many other things that I cannot mention here.

Asia as a whole was characterized by various forms of abundance eliciting strong emotions: powerful empires, natural bounty and marvels at the edge of what was possible. The monsters described by these authors were almost, but not quite, incredible. By implication, there were stories of other, unbelievable monsters. This is an important concession to these authors, since Fra Mauro notes elsewhere that many accounts of monsters were merely tall tales. For him, it was reasonable that India should contain things that were marvelous. What was not clear was the relation between the credibility of a marvel and whether it existed at all: monsters in India were just within the bounds of belief, but had they been just outside them, that would not necessarily have meant that they did not exist. The earlier Hereford map also made reference to “unbelievable” wonders of India that were, nonetheless, said to be present in India. What such references to doubtful elements suggest is that late medieval and Renaissance mapmakers were concerned that what they considered to be real, and relevant for inclusion on a map on that basis, was not

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necessarily believable to the viewers of their maps. Equally, things which readers of maps—or travel accounts, for that matter—found believable were not necessarily true.

For Fra Mauro, India was so diverse that it could not be represented adequately on a map, even one as large as this example:

...there are many kingdoms and provinces, which I have not included because of lack of space. Thus, I have decided to omit many things of note and take out those that seemed to me to be the best known. And I have not even made mention of many rivers, mountains and deserts in various parts. . . Similarly, I have decided to refrain from speaking of the novelties, customs and condition of the magnificent peoples and powerful seignories and the great diversity of animals and of an infinite number of other things.

This is a rare justification for what a mapmaker has included and excluded. Historians of cartography have often leveled charges of sensationalism at mapmakers. This extract offers an alternative possibility. In the absence of sufficient space, the best-known material may be excluded in order to communicate what is new, unexpected or little known.

Fra Mauro valued eyewitness observations highly. In his discussion of Southern Africa, he explicitly challenges those who suspect new information, asserting that

...because to some it will appear as a novelty that I should speak of these Southern parts [of Africa], which were almost unknown to the ancients, I will reply that this entire drawing, from Sayto upwards, I have had from those who were born there. These people are clerics who, with their own hands, drew for me these provinces and cities and rivers and mountains with their names.

Fra Mauro could have obtained this information from Ethiopian and Coptic clerics on their way to the Council of Florence; the retinue arrived in Venice c. 1440–1441. His mapping of Southern Africa, he tells us, descends directly from eyewitness observations. He made a related point to justify his placement of Babylon on the Tigris and not the Euphrates where some writers had placed it, challenging his detractors to ask those who had seen Babylon to judge his map.

Fra Mauro explicitly states his preference for contemporary travelers' sources with regard to distant lands. He notes that "many opinions and texts" (*molte opinion e leture*) assert that the Indian Ocean could not be reached by sea from West Africa, opinions that probably derived from Ptolemy's *Geographia*. Nevertheless, sailors on Portuguese-sponsored expeditions, who had begun to sail along the West African coast, believed otherwise, and had yet to find the limits of navigability along the African shoreline. He reveals that these sailors "have drawn new navigational charts" (*hano fato nuove carte*), of which he had a copy. Such sailors' records also made them textual authorities—thus challenging the only card in the hands of those who wrote, but had seen nothing. He continues by contending that if one disagrees with those "who have seen with their own eyes" (*questi i qual hano visto ad ochio*), then there is even more reason for dissenting from those who did not. In the arbitration between contradictory textual sources, those who were writing about what they had seen were more valuable. Of course, Fra Mauro's own map was an amalgamation of information that he described but had not seen.

One might wonder, then, how Fra Mauro thought his own readers should evaluate his map. He values those who report the testimony of named travelers, something he frequently does himself. Regarding the possibility of reaching India by sailing around Africa, he notes how he

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spoke with “a trustworthy person” (“*digna de fede*”) who, caught in a storm on an Indian ship, traveled (according to the ship’s astronomers) some 4,000 miles. He then cites Pomponius Mela who, in his *Cosmographia*, described how Eudoxus, fleeing the king of Alexandria, sailed from the Persian Gulf to Cadiz, thus rounding the Cape of Good Hope. From this he deduced that the Indian Ocean was not a landlocked sea, adding that “this is what is said by all those who sail this sea and live in those islands”. The reader is given no explanation why the person caught in a tempest is trustworthy; we are perhaps, to trust Fra Mauro on this account. The caption ends by offering indigenous informants as trustworthy authorities, but no explicit reason is given as to why a mid-15th century European should believe the word of those whom they would have considered to be pagans or infidels. The only possible reason for believing them is their status as eyewitnesses. Their testimony is also given the stamp of traditional authority through the reference to Pomponius Mela’s story of Eudoxus’ escape. Eudoxus’s status as a named source strengthened Pomponius’ account. The authority of a known eye-witness could be transferred from one commentator to another, forming an ear-witness of the new commentator—as indeed Fra Mauro was fashioning himself to be.

The tension between texts written by those who had seen things and those who had not (albeit often including claims that they had spoken to eye-witnesses) comes to a head in a discussion about monstrous peoples in West Africa. Fra Mauro was working during a period when new information about the region was becoming available:

Because there are many cosmographers and most learned men who write that in this Africa—and, above all, in the Mauritanias—there are human and animal monsters, I think it necessary to give my opinion. Not because I want to contradict the authority of these men but because of the care I have taken in all these years in studying all possible information concerning Africa: from Libya, Barbaria and all the Mauritanias... And through all these kingdoms of blacks I never found anyone who could tell me anything about that which I have found written about it; thus, not knowing of it anything to which I can bear witness, I leave the research to those who are curious to learn of such novelties.

This rare show of deference towards learned authorities prompts Fra Mauro to explain the map’s dearth of monsters. It is not their wondrousness that has rendered them incredible and inappropriate for inclusion, but the sedentary nature of those who had described them. Given his inability to find anyone from Africa who could corroborate these statements, he decided that he “cannot bear witness to anything”. This turn of phrase is a key one: effectively, he sought to become an ear-witness by hearing eyewitness testimony on monsters and carrying it, as it were, to his own audience. This interpretation of the idea of witnessing allows him to give the impression that he himself had travelled through Africa looking for first-hand reports while at the same time leaving open the possibility that he had not, and was not falsely claiming to have done so; the sparse evidence about Fra Mauro gives no hint of such a journey. Curiously, he does not allow here for scholars who might themselves have painstakingly gathered the testimony of travelers.

Fra Mauro’s discussions reveal a mapmaker who was keenly interested in assessing his sources critically. His map simultaneously critiques pre-Ptolemaic and Ptolemaic geography and attempts to synthesize them, along with the newest eye-witness information, into a coherent world-picture-text. He also felt compelled to record information on things about which he was

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unsure. While he preferred sources with links to eye-witnesses, he was unable, even reluctant, to disengage from authorities lacking named witnesses, even when he disagreed with them. Yet his judgment of the authority of sources solely on the basis of their access to eyewitness testimony indicates that late medieval notions of authority, where the moral status of a witness or text was important, were rather less relevant for mid-15th century Venetian cartographers than in other contexts, such as Renaissance France or early modern England. The fact that Fra Mauro was based in a sea-faring republic, whose sailors depended on verifiable and repeatable sailing directions in order to survive, may have made the testimony of first-hand observers particularly important for him.

It is curious that one of Fra Mauro's main sources was Marco Polo's *Divisament dou Monde*, but none of these moments of doubt relate to Polian material. In fact, Polo is not mentioned by name anywhere on the map. As Angelo Cattaneo has recently shown, Fra Mauro's use of the Latin and Venetian recensions of the *Divisament* took the forms of borrowing toponyms and historical events, summarizing passages, verbatim quotation, and illustrations of aspects of the text; the *Divisament* also shaped the map's overall structure. In 1430, a certain Meo Ceffoni noted that a copy of *Il Milione* was "chained at the Venice Rialto so that everyone can read it". While the story may well be apocryphal, it bears witness to the Venetians' familiarity with the work during the mid-15th century. The fact that Fra Mauro did not need to cite *Il Milione*, as it was known in Italian, might indicate that it was unnecessary to do so.

Fra Mauro's overall view of his own work might be one of frustration. In a caption introducing the map, he noted that "it is not possible for the human intellect without divine assistance to verify everything on this cosmography or map of the world, the information which is more like a taste than the complete satisfaction of one's desire". He notes that Ptolemy himself conceded that it was impossible to speak accurately about regions that were rarely visited, and that future travel would improve his own image of the world. He goes so far as to assert that, for Ptolemy, life was "brief and experience fallible . . . he concedes that with time such a work could be better produced or that one could have more definite information than he has here". This, then, is Fra Mauro's justification for having "tried to validate written sources with experience, researching for many years and profiting from the experience of trustworthy persons who have seen with their own eyes". Where geography was concerned, the very primacy of eye-witness authority could be justified on the basis of an ancient author, Ptolemy.

Fra Mauro's discussions reveal a mapmaker who was keenly interested in assessing his sources critically. His map simultaneously critiques pre-Ptolemaic and Ptolemaic geography and attempts to synthesize them, along with the newest eyewitness information, into a coherent world-picture-text. He also felt compelled to record information on things about which he was unsure. While he preferred sources with links to eye-witnesses, he was unable, even reluctant, to disengage from authorities lacking named witnesses, even when he disagreed with them. Yet his judgment of the authority of sources solely on the basis of their access to eye-witness testimony indicates that late medieval notions of authority, where the moral status of a witness or text was important, were rather less relevant for mid-15th century Venetian cartographers than in other contexts, such as Renaissance France or early modern England. The fact that Fra Mauro was

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In the broader contexts of geography and navigation, the importance of first-hand experience was self-evident in late medieval maritime centers. *Portolan* charts and *rutters* [books of directions] summarized and organized travelers' experiences of sea-borne travel. But what was unusual about Fra Mauro's map was the amount of space dedicated on the map to evaluating and critiquing sources. Fra Mauro showed the reader his thought-processes. In so doing, he left us with clues to how mid-15th century Venetian cartographers could think about the wondrousness of the outside world, and of the very routes to it.

From the era of the *mappaemundi* to the mid-17th century, world maps were picture-texts upon which the important, little-known and surprising aspects of history and geography, abstracted from a plurality of sources, were gathered together for easy reference. To infer from this that cartographic workshops were hotbeds of sensationalism and tabloid journalism would be to misunderstand how they functioned and were understood in their own time. As Fra Mauro noted more than once, there was no room on a map of the world to record everything. The map was intentionally a selective rather than representative summary intended to help viewers distinguish one region from another, and to set historical events in a geographical context. What these maps do tell us is how this significance was conceptualized—what seemed historically important or surprising to their makers.

On Fra Mauro's map and on later maps we see a similar methodology by which readers evaluated the claims that were made for distant places. Another continuity is the preference for citing Marco Polo. While scholars consider Mandeville to have been more popular than Marco Polo until the mid-16th century, among mapmakers, Marco's word on Asia was the preferred reference for nearly two centuries.

The mapmakers' need to repeat information that they claimed not to believe may have been a way of signaling that they knew their classical sources, that they had had a proper education. A number of the cartographers considered here were closely involved in humanist scholarship. Rehearsing ancient geographical ideas on one's map was a way of showing that you knew the history of your discipline—the cartographic equivalent of an introductory survey, in which you relate the twists and turns of scholarly thinking that preceded your own.

To what extent did something new take place in the Renaissance? Occasional references to proof and reliability of sources on medieval maps show that mapmakers had long been grappling with these issues, and that the East was a particular problem, since it was truly wondrous but—and indeed, wondrous and therefore—unbelievable. What was new in the Renaissance was the citation of, literally, chapter and verse, when providing details of a textual authority: once printed books began to appear, more regular systems of referencing began to emerge.

Since maps and geographies were themselves read widely in this period for ethnographic as well as topographic information, they in turn shaped ideas about distant places. Mapmakers had to grapple with the problem of assessing the reliability of travelers who, as a popular proverb

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recounted, could lie with impunity since their claims could not be tested. The commentary on maps such as Fra Mauro's world map reveals how seriously some of them took their task.



CONCLUSIONS

Different perceptions and discursive traditions pertaining to the concept of space were therefore at the onset of affirming the systematic use of cartography as a means for the construction of territorial relations and their representation. By conflating the classical geography of the ancient authors with the testimonies of the moderns (sea charts, *mappae mundi*, *portolani*) from the beginning of the 13th century a process began that, by placing geography at the service of universal history and commerce, led to the affirmation of cartography as an effective medium of representing and constructing space. Traditional histories of cartography contain a number of misconceptions concerning the *mappaemundi*. The three most important of these are: (1) the assumption that geographical accuracy was the prime function of the *mappaemundi* (and hence that their goal was poorly achieved); (2) the assumption that Jerusalem was almost invariably placed at the center of the maps; and (3) the notion that the *mappaemundi* illustrated and confirmed the popularly held view of the earth as a flat disk.

Although Crone drew attention to what he considered to be the route-planning function of some world maps, such as the representation of pilgrimage routes on the Hereford map, no amount of 20th century historiographic ingenuity can counteract the overwhelming evidence that the function of the *mappaemundi* was primarily didactic and moralizing and lay not in the communication of geographical facts. The history of cartography, like the history of science, is moving away from being primarily a search for precursors and is attempting to understand cartographic activity and developments in various periods on their own terms. In the light of this interpretive shift, it now seems strange to read the views of the older historians of geography, such as Charles Beazley, who simply refused to describe such unambiguously cartographic manifestations of medieval culture as the *Hereford* and *Ebstorf* maps (#226, #224) on the

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grounds that they appeared as retrogressions to an ever-improving literal geographical picture of the world. In view of scholars such as Charles Beazley, the only purpose of maps was precisely that of providing an accurate representation of the distribution of places and events in an increasingly “correct” continental outline. The importance of the symbolic content of the *mappaemundi* has thus now been established. This symbolism is a blend of the historical and the geographical. Medieval maps consist of historical aggregations or cumulative inventories of the major events in both the Christian and the secular legendary history of the world, particularly the former. The three major events in the Christian history of the world: its creation, salvation by Christ, and the Last Judgment, commonly are symbolically portrayed on the maps or by the maps themselves, as in the *Ebstorf* map, which is a clear representation of the world as the body of Christ. There are also many examples where details in religious and secular history that span a thousand years appear on a single map without any differentiation between historical and contemporary geographical information. They, therefore, can be seen as projections of history on a geographical base.

It has also been shown that the practice of placing Jerusalem at the center of the *mappemundi* was by no means a universal convention throughout the Middle Ages but was largely confined to the post-Crusade period in the 13th and 14th centuries. Once interest was focused particularly on Jerusalem after the main period of the Crusades, there does appear to have been a trend in this direction until the end of the Middle Ages when the assimilation of new geographical information and frameworks from Ptolemy's *Geography*, the development of the *portolan* charts, and the Renaissance discoveries led to a redefinition of the outer borders of the world map and a displacement of the traditional center.

It is also commonly assumed that the best-known form of medieval *mappamundi*, the T-O map, with its tripartite division of the inhabited world and the surrounding ocean river, was *prima facie* evidence for universal medieval belief in a flat earth, a misconception still perpetuated in some school history texts in the context of Columbus' discovery of the New World. On the contrary, it has been shown that the influential Isidore of Seville, despite the ambiguity in his writings, was probably quite aware of the earth's sphericity, and a score of medieval church fathers, scholars, and philosophers in almost every century from the fifth to the 15th stated this categorically. Furthermore, by the 14th century, thinkers such as Roger Bacon not only knew the earth was spherical but described the need for map projections to satisfactorily transform the curvature of the earth to a flat plane.

The study of *mappaemundi* is well served in comparison with other types of medieval maps, by general checklists and facsimile atlases. Sadly lacking are the detailed studies of individual maps and groups of maps in their cultural context along the lines of the work done by Durand for the 15th century *Vienna-Klosterneuburg* map corpus. Obvious priorities would include regional studies on the *mappaemundi* associated with the geographical culture in 13th century England or on the general role of the medieval Franciscans in the development of systematic cartography. There is a need to develop the construction of stemmata to show the pedigree of maps of the eighth century and later. Also the academic community of cartographic historians in the West need to expand and integrate their studies to better encompass the work and

contributions of non-European mapmakers.

Modern historians have emphasized that both the abruptness and significance of the change from the medieval to the modern world have been grossly exaggerated. Rather than focusing on the 15th century as a time of dramatic transition between the two ages, as earlier historians had done, they point backward to the several renaissances that took place in the Middle Ages and forward to the medieval and occult character of much 16th and 17th century science. Although this caution is also appropriate when discussing the specific case of the conceptual shift between medieval and Renaissance cartography, the overwhelming conclusion is still that a rapid and radical change in the European world view took place during the 15th century.

In retrospect we can see that in the late medieval period there were several fundamentally different ways of looking at geographic space and representing geographic reality. One relied upon the concept of consistent physical measurement and scale, another upon the notion of varying scale depending upon perceived importance or the affective qualities of iconography, and another stressed qualitative topological relationships of adjacency and connectedness rather than those of measured distance and area. It is not unusual to find side-by-side, and often in the same manuscript, maps drawn on different structural frameworks and with widely different functions. In many 15th century world maps, the various structures appear within the confines of the same map: a frame and center of an iconographical medieval *mappamundi*, the configuration of a measured nautical chart for the Mediterranean, and towns, rivers and regions topographically fitted in between.

At the beginning of the 15th century, a new concept of ordering geographic space was introduced to the Christian West. Although Roger Bacon in his *Opus maius* (ca. 1265), had already proposed mapping the earth with coordinates of latitude and longitude, it was not until 150 years later, with the translation into Latin of Ptolemy's *Geography* (1406), that abstract, geometric and homogeneous space began to be used for mapping. For geography, cartography, and the associated practical mathematical arts in the western world, therefore, the 15th century was crucial in forming *the first coherent and rationally cumulative pictures of the world since antiquity*. A key ingredient was that a transition took place in the way people viewed the world, from the circumscribed cage of the known inhabited world to the notion of the finite whole earth. For geography and cartography, this meant a movement away from local topographical concepts and towards those of a finite, spatially referenced spherical earth, a *tabula rasa* upon which the achievements of exploration could be cumulatively inscribed. No maps of the whole earth survive from the 15th century, but interest in the concept of showing the earth as a globe was obviously present, as the references to globes before Behaim's globe of 1492 (#258) attest.

Angelo Cattaneo summarizes that Medieval cosmography was the culmination of a cultural synthesis uniting Christian cosmology, Aristotelian natural philosophy of scholastic origins, Latin and Greek classical author—chiefly, from the 15th century onwards, Ptolemy²—and accounts of the voyages undertaken by more recent writers such as the missionaries who traveled to Asia in the 13th and 14th centuries. The latter included the Franciscans John of Pianocarpine (c. 1182-1252), William of Rubruck (c. 1220 – c. 1293), Odoric of Pordenone (c. 1265-1331), John of Montecorvino (1247-1328).³ Another major influence was that of merchant travelers, from Marco Polo and

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Niccolò de' Conti to the more numerous protagonists of European expansion. To these were added reports about pilgrimages to the Holy Land, and geographic treatises of medieval compilers such as the 13th century Ristoro d'Arezzo,⁴ Marino Sanudo the Elder (c. 1260-1343),⁵ Friar Paolino Veneto (c. 1270-1344), Fazio degli Uberti (died c. 1370)⁶ as well as the cardinals Pierre d'Ailly (1350-1420)⁷ and Guillaume Fillastre (1428).⁸

Furthermore, from the close of the 13th century onwards was the knowledge transmitted orally by travelers, monks and merchants, diplomats, ships' captains, whose reports often remained anonymous, and which were compared with ancient and more recent written sources. It is noteworthy that not only cartographers such as the Majorcan Jewish Cresques at the end of the 14th century (#235), the Venetian Camaldolese Fra Mauro (died c. 1459/64, #249) and the German merchant Martin Behaim of Nuremberg (#258), who was active in Portugal during the second half of the 15th century, but also Petrus de Abano (1257-1315), a professor at the University of Padua, relied on oral testimonies. Thus, Petrus de Abano cited as authoritative what Marco Polo had told him about the southern sky. Oral testimonies increasingly served as the basis of descriptions of Northern Europe, Asia and Africa and, from the late fifteenth century onwards, also of the 'New Worlds'.⁹

The scientific status of universal cartography before the early modern period was marked by theoretical reflections on the functions of representational cartography of two medieval authors, Hugh of St Victor (c. 1096-1141) and Fra Paolino Veneto (c. 1270-1344). Hugh of St Victor shows clearly in the foreword of one of his long forgotten works, the *Descriptio mappe mundi*—the description and commentary of a large circular map of the world found in this abbey¹⁶—how the pictorial representation of the *imago mundi* had already been transformed during the twelfth century into an independent and legitimate form of cultural expression, itself becoming the object of semiotic analysis and commentary:

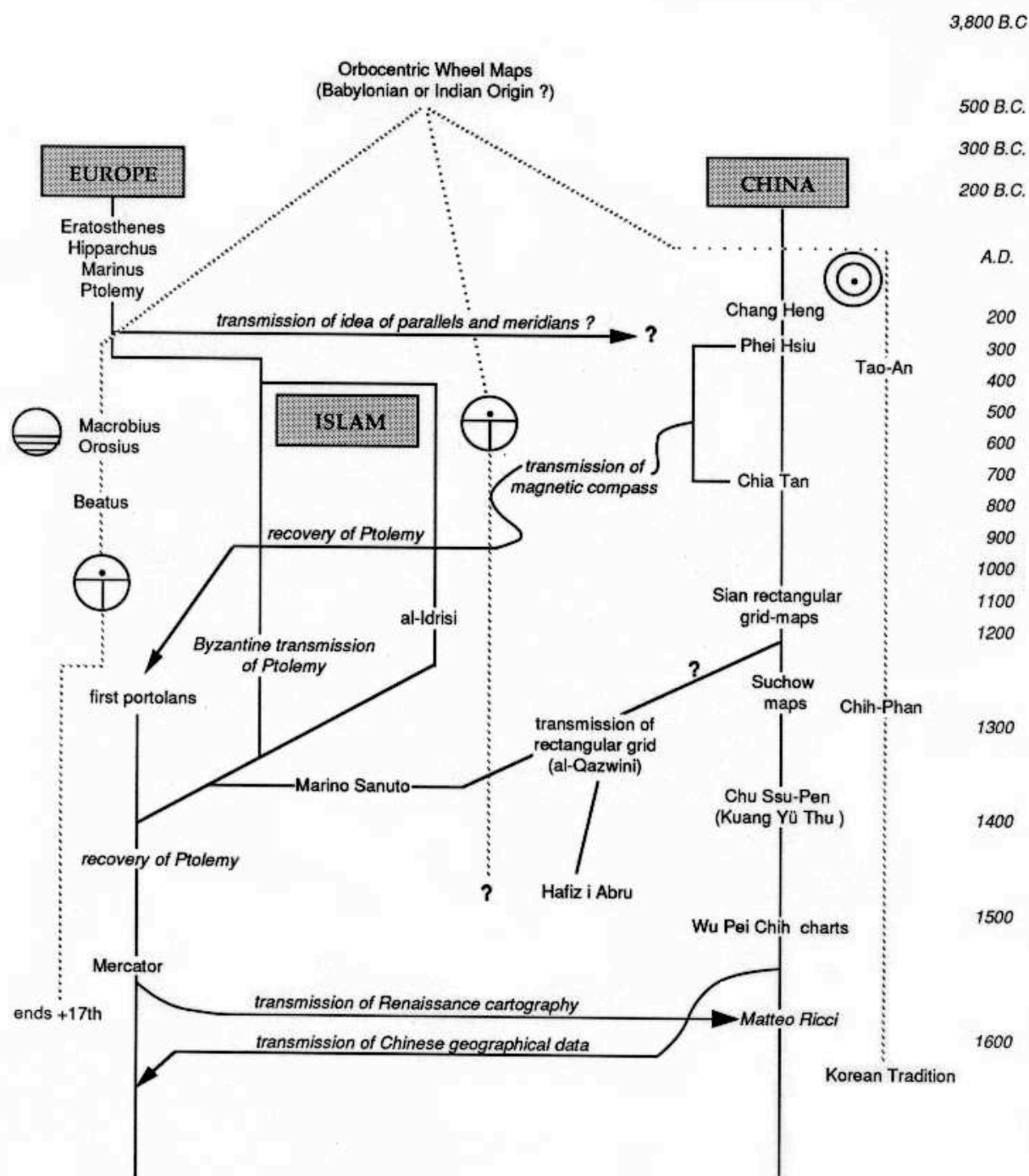
Therefore we have proposed in this work not to depict but to describe the map of the world, that is to say not things or the images of things, but rather the meanings, we wish to show not what the things themselves signify but by what they are signified.



PRINCIPAL WORLD MAPS OF THE FOURTEENTH AND FIFTEENTH CENTURIES

(Shape: C, circular; O, oval; Od, ovoid; R, rectangular. Orientation: E(ast), N(orth), S(outh) to top.)

<i>Author or Description</i>	<i>Date</i>	<i>Place of Origin</i>	<i>Shape</i>	<i>Ori-entation</i>	<i>New information on:</i>	<i>Remarks</i>
Giovanni da Carignano	ca. 1310	Genoa (Italy)	R	N	The Baltic and Africa	A land map of the Western World drawn in portolan style, with much detail on the interior of Africa.
Fra Paolino Minorita	ca. 1320	Avignon (France)	C	E	Asia and the Far East	Including some geographical data from Rubruck. (See R. Almagià, <i>Monumenta Cartographica Vaticana</i> , Vol. 1, pp. 3–8 and pl. I.)
Petrus Vesconte	ca. 1321	Genoa (Italy)	C	E	Asia and the Far East	Ten world maps either signed by him, or of his authorship and included in Marino Sanuto's <i>Liber Secretorum Fidelium Crucis</i> . Apparently based on the map of Fra Paolino.
Ranulf Higden	ca. 1350	Chester (England)	O, Od	E	—	—
World map in Laurentian ('Medici') sea atlas	1351	Italy	R (after a prototype C)	S	The Baltic, the Atlantic islands, Africa, Asia	Perhaps the earliest map to show the Azores. The southward extension of Africa is a later addition.
Marco and Francesco Pizzigano	1367 1375	Venice (Italy)	R	N	Africa	A land map and atlas of the Western World, drawn in portolan style.
Abraham Cresques, Catalan atlas	1375	Majorca	R (after a prototype C or O?)	N	Asia and Far East, Africa	The first map to incorporate the discoveries of Marco Polo in detail. Drawn in portolan style.
Borgia world map	15th cent. (first half)	S. Germany?	C	S	—	Archaic in character.
Pirrus de Noha	1415(?)	Italy	R	N	—	Ptolemaic in form.
Albertinus de Virga	ca. 1411–15	Venice (Italy)	C	N	—	Probably derived from the Laurentian sea atlas.
Andrea Bianco	1436	Venice (Italy)	C	E	The Baltic, the Atlantic islands, coast of W. Africa	See below, pp. 124–27.
Giovanni Leardo	1442–52/3	Venice (Italy)	C	E	Asia and the Far East	Eclectic works, including data from Nicolò de' Conti and from Catalan maps.
Andreas Walsperger	1448	Constance (Switzerland)	C	S	—	
Catalan-Este world map at Modena	ca. 1450–60	Majorca?	C	N	Africa	Similar in content and representation to the Catalan Atlas of 1375. Sometimes ascribed to the fourteenth century.
'Genoese' world map	1457	Genoa (Italy)	Od	N	—	An eclectic work, similar in content to the Leardo maps.
Fra Mauro	1459	Venice (Italy)	C	S	Many regions	A conspectus of fifteenth-century geographical knowledge, cast in medieval form.



*Chart showing the comparative development of cartography in the East and the West
(adapted from Needham)*