



y second volume in this series of five volumes, contain monographs that may be thought of as an anthology of maps, which, like all anthologies, reflects the taste and predilection of the collector. It may also be likened to a book of reproductions of works of art, in the sense that the illustrations, even with the accompanying commentary, cannot really do justice to the originals. In this case, many of the illustrations are in black and white, many are reduced in scale, and some are merely fragments, (re-) interpretations, or reconstructions. But they will have served their purpose if you are encouraged by reading this book to look at maps critically, to comprehend their strengths and limitations, to appreciate them aesthetically, and to use them more intelligently.

There is no attempt here to develop a treatise on the evolution of the modern map, or at a history of cartography. The intent in this volume is to explore through personally selected monographs and individual maps that make up that history during the early medieval period. This very long and rather neglected chapter of cartography spans a rather vague time frame that begins around the third or fourth century of the Christian era, and continues until approximately the 14<sup>th</sup> century. While covering a thousand years of man's history, the graphic representation of the physical world, especially in Western Europe, experienced a remarkable lack of progressive "scientific" development, resulting in little or no direct impact on today's maps. Yet, as will be shown, this apparent lack of scientific development should not be the only criteria upon which these cartographic efforts are evaluated or judged; but instead they should be assessed based upon the intent and purpose for which they were originally made, as interpreted by the cartographer.

Maps were not commonplace in the early medieval world. Spatial information, which today would be represented cartographically, was instead communicated textually: written as lists, registers (known as *terriers*), or itineraries. Unlike the Classical ancient world of the Greeks and Romans, in which maps were more common and made for a variety of purposes, map-making in the early Middle Ages was almost exclusively an ecclesiastical enterprise. As Daniel Boorstin puts it: "Christian Europe did not carry on the work of Claudius Ptolemy (#119). Instead the leaders of orthodox Christendom built a grand barrier against the progress of knowledge about the earth. Christian geographers in the Middle Ages spent their energies embroidering a neat, theologically appealing picture of what was already known, or was supposed to be known."

Geography had no place in the medieval catalogue of the "seven liberal arts." Somehow it fit neither into the quadrivium of mathematical disciplines (arithmetic, music, geometry, and astronomy) nor into the trivium of logical and linguistic disciplines (grammar, dialectic, and rhetoric). For a thousand years of the Middle Ages no common synonym for "geography" was in ordinary usage, and the word did not enter the English language until the mid-16<sup>th</sup> century. Lacking the dignity of a proper discipline, geography was an orphan in the world of learning. The

subject became a ragbag filled with odds and ends of knowledge and pseudo-knowledge, of Biblical dogma, travelers' tales, philosophers' speculations, and mythical imaginings.

It is easier to recount what happened than to explain satisfactorily how it happened or why. After the death of Ptolemy in the first century of the Common Era (CE), Christianity conquered the Roman Empire and most of Europe. Then we observe a Europe-wide phenomenon of scholarly amnesia, which afflicted the continent from 300 to at least 1300. During those centuries Christian faith and dogma suppressed the useful image of the world that had been so slowly, so painfully, and so scrupulously drawn by ancient geographers. We no longer find Ptolemy's careful outlines of shores, rivers, and mountains, handily overlaid by a grid constructed on the best-known astronomical data. Instead, simple diagrams authoritatively declare the true shape of the world, though they are only pious caricatures. This is unsurprising: cartography is a highly literate form of communication, and the clergy were the most well-educated members of society. The few maps that were drawn in the early Middle Ages were often simple diagrams, designed to illustrate and reinforce ecclesiastical texts, rather than replace or supersede them. The early Christian Church sought to establish a universal cosmology, and maps were sometimes used to illustrate written concepts. Most notably, the seventh century scholar Isidore of Seville included simple maps in his *Etymologiae* and *De Natura Rerum*, known as T-O diagrams (#205). Having originated in antiquity, they depicted the three known continents – Europe, Africa, and Asia – schematically. Through the dissemination and popularity of Isidore's texts, these early maps became popular throughout Europe.

These were *Ecumenical* maps, for they aimed to show the *Ecumene*, the whole known inhabited world. Designed to express what orthodox Christians were expected to believe, they were not so much maps of knowledge as maps of Scriptural Biblical dogma. The very simplicity that offends the geographer testifies to the simple clarity of Christian belief. According to Scripture, as Isidore of Seville explained, the inhabited earth had been divided among the three sons of Noah: Shem, Ham, and Japheth. Asia was named after a Queen Asia “*of the posterity of Shem, and is inhabited by 27 peoples ... Africa is derived from Afer, a descendant of Abraham [Ham], and has 30 races of 360 towns,*” while Europe, named after the Europa of mythology, “*is inhabited by the 15 tribes of the sons of Japheth and has 120 cities.*”

When seeking the meaning and purpose of European medieval maps, one cannot assume that maps were used for the same purposes or had the same meaning as they do today. The differences in structure and content are clues that lead us to image how medieval makers and readers of maps saw the world. Another place to look is the context in which maps appear, for a majority of surviving medieval maps appear in books, surrounded by written works and other diagrams. These accompanying materials can tell us much about the role of maps in medieval thought and society. Evelyn Edson, in her book *Mapping Time and Space*, puts forth this thesis that a study of the context of medieval maps in books reveals that many were designed to encompass concepts of time as well as space. Such an idea has already been broached by the German scholar Anna-Dorothee von den Brincken. Looking at maps themselves, particularly the larger world maps, she says their goal is to ‘portray the course of universal history together with totality of historical space’. Von den Brincken's theory helps explain the persistent inclusion of

historical places on medieval maps. The city of Troy, the Garden of Eden, the route of the Israelites from Egypt to Canaan were as consistently shown as physical features, such as the Pyrenees, or places of contemporary significance, such as the city of Rome. It also helps explain why some medieval maps were referred to by their makers as '*histories*'.

The following pages present a brief introductory outline of the overall geographic, cosmographic and cartographic activity during the early medieval period in order to place the accompanying monographs in their historical perspective. It should be noted that the early medieval map, which filled the period between the decline of the scientific method (Greek/Ptolemaic) and the rise of the more practical maps demanded of the great age of discovery, differed essentially from the productions of both. Unlike the early Greeks and individuals such as Marinus of Tyre and Claudius Ptolemy (#119), or even the medieval cartographers of the East (Chinese and Muslim), early Christian (European) medieval cartographers made no use of astronomical observations, nor did scales, latitudes and longitudes find a part in their scheme. Their maps were based upon pre-Ptolemaic and pre-scientific models, which had already become debased and which, in their hands, suffered still further distortion. To the medieval mind, symmetry and authority were more esteemed than geographic accuracy and truth. A taste for the fabulous also produced extraordinary representations, which unknowledgeable copyists still further compounded. Neither were these maps practical; they did not attempt to depict the physical world as it really was, but instead laid down a picture, often reduced to a mere symbol, of the geographical system described in some contemporary popular work for which they were used to illustrate.

The history of earlier, ancient geography and later, Renaissance geography, has occupied the attention of eminent scholars for many ages, but the serious study of medieval cartography/geography is of more recent date and of much slighter extent; most writers on the general history of cartography/geography having dealt with it very slightly or neglected it entirely. For this neglect there seem to be three basic reasons: (1) as stated previously, early medieval *mappaemundi* have had no significant place in the development of the modern map, upon which they exercised virtually no influence; (2) they seldom actually represent the best contemporary medieval geographical knowledge; and (3) the original material is not easily accessible to students or collectors, nor has there been a sufficient number of accurate reproductions made available for study and analysis.

In the millennium that links the ancient and modern worlds, from about the fifth to the 15<sup>th</sup> century after Christ, there developed in the West a genre of world maps or map-paintings originating in the classical tradition but adopted by the Christian church. One of the primary purposes 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 South 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.

But if medieval *mappaemundi* had no direct influence on modern cartography, they are surely worthy of study as representatives of earlier world diagrams, now lost, of which we can hope to gain an idea only by the comparative examination of their derivatives. The study of medieval maps is not one that leads the mind of the student forward to modern methods and ideas, but is one that directs his inquiries backward towards the origins of cartographical representation and also reflects the strong influence and emphasis of Christianity in Europe at this time. It is as much a subject for the antiquary and the historian as for the geographer. As Canon Bevan says in his essay on that quintessential example of medieval cartography, the Hereford map (#226): “Viewed in a strictly geographical aspect, as a representation of the world at the time of its execution, the map would not repay anyone for the time spent in its study. Viewed, on the other hand, as a literary monument on which is registered the position of learning towards the close of the 13<sup>th</sup> century, the map will be found worthy of examination”.

While medieval *mappaemundi* normally do not reflect the best geographical knowledge of their age, they have, however, undoubtedly preserved for us the materials upon which the ordinary person of the period (i.e., one who was highly limited in his travel) formed his conception of the world in which he lived. Many European medieval maps are to be found, not in special geographical treatises, which were studied only by the few, but generally appear as illustrations in some of the more popular works of the Middle Ages. As mentioned earlier, medieval maps are to be found in historical and in encyclopedic works; in philosophical and semi-philosophical treatises; in chronicles, and to a lesser degree in theological disquisitions. Many of these works were hand-copied extensively and read constantly by the medieval student, and, as graphic representations, were generally more impressive than the associated written descriptions. Therefore, the maps must have materially influenced medieval man's geographical and cosmographical ideas and diagrams that were brought before his eyes, even should those maps and diagrams illustrate a knowledge less true and less accurate than that to be found in the more uncommon geographical texts to which he might sometimes have had access. The strongest claim, therefore, for the study of medieval *mappaemundi* seems to be that, from them, we may hope to gain insight into that category of medieval thought which was concerned with a subject that, at all times and in all circumstances, was of the highest importance to the human race, a knowledge of the world, during the thousand-year period prior to the great age of discovery and exploration.

The greatest obstacle to the study of medieval (or any) maps is, however, the lack of accessibility to the maps themselves. This is especially true for maps made during this period, since all were manuscript (hand-drawn) maps. In the case of maps of the Renaissance period, this obstacle has been overcome because they were either originally printed in quantity, or, if in manuscript form, there has been continuing efforts to produce sufficient numbers of quality facsimiles. Isolated examples of medieval maps have indeed been reproduced, even as early as the year 1611, but the overall number of medieval facsimiles is small and even those are rather inaccessible. In 1849 the Viscomte de Santarem published the first volume of his work on medieval cosmography and cartography entitled, *Essai sur l'Histoire de la Cosmographie et de la*



*Cartographie pendant le Moyen-Âge*. Here Santarem enumerated only twenty-three medieval maps known by him to have been previously published, and of these only eight were complete, the remainder being merely fragments. In his now famous facsimile atlas, Santarem published reproductions of 117 medieval *mappaemundi*, thus laying the foundation of their study. Good work on a smaller scale was also done about the same time by the Polish antiquary Joachim Lelewel, by D'Avezac, and later by such students as, Heinrich Wuttke and Jomard, although nothing approaching Santarem's work in importance appeared until 1895 when Dr. Konrad Miller of Stuttgart, published his six slim volumes on medieval *mappaemundi*, in which he deals with some 200 examples (with seventy reproductions), and which today represent the standard work on the subject. The addition of new material was considerable, but the value of Miller's work to the student is mainly due to its thorough examination of certain of the larger maps, and to his comparative study of some of the smaller and less known groups. His work in the latter direction was, however, greatly restricted by the relatively few examples of each type that were known to him.

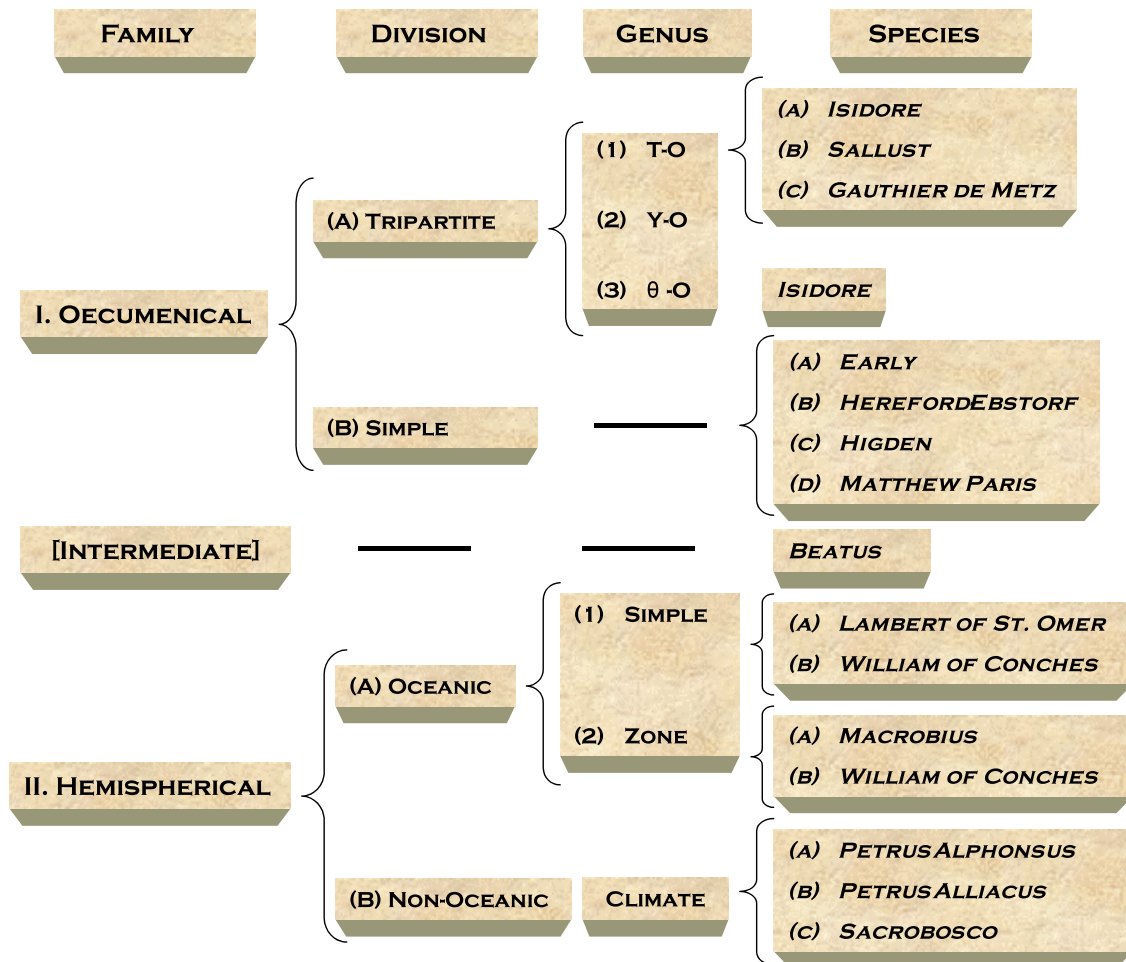
Any search for further examples by more recent scholars make it evident that a rich and almost unexplored field is open to the student. The systematic examination of many manuscripts in libraries worldwide has resulted in the accumulation of a collection of about 1,100 examples of medieval *mappaemundi*, ranging in date from the eighth to the 15<sup>th</sup> century. Although only a small proportion of these are of a large size or of elaborate execution, even the smaller, more elementary and symbolic designs are of considerable interest. However, for the reasons noted earlier, this long period of cartography remains a relatively neglected topic and it is hoped that at some future time it may be found possible to publish the existing examples of medieval maps in facsimile, in order to provide more accessible material for an extended and more systematic study of the subject. Other, more recent scholars who have contributed to this discovery and examination of medieval maps include M.C. Andrews, C.R. Beazley, L. Bagrow, M. Destombes, G. Kimble, J. Needham, J.K. Wright, E. Edson, S. Westrem, A. Scafi, P.D.A. Harvey, and volume one to *The History of Cartography* edited by J.B. Harley and D. Woodward (see the *Bibliography attached to these monographs*).

To date, scholars have largely sought to analyze the corpus of *mappaemundi* by devising systems of classification. Typologies sort maps into categories based on formal criteria and putative relationships to texts that supplied the foundations of geographical knowledge. Behind every map lies a source map or set of source maps from which it was presumably derived. Attempts to retrace lines of descent from archetype to copy assume that extant works are somehow genealogically related, either through direct affiliation or more likely through common ancestry. The focus on family resemblances can also tend to obscure the critical importance of difference. In fact, extant maps are highly individualized within the limits of their genre; no two are identical. According to M.C. Andrews, in the various examples of medieval world representations that have been brought to light one can find clear evidence of two very different conceptions of our earth. One is due to the early and simple idea of a small and inhabited flat disc; the other to a more scientific realization of a large sphere, of which only a small part was known. Medieval *mappaemundi* may, therefore, be divided into two great *Families*. First, those which seek to

represent only the habitable world, the *oikoumene* of the Greeks, the *Terra Habitabilis* of the Romans. Andrews, in an essay written in 1925 on the study and classification of medieval *mappaemundi*, gave this *Family* of maps the name *Oecumenical* or *Ecclesiastical* maps. The second *Family*, according to Andrews, embraces those maps which represent the whole hemisphere, and which he labeled *Hemispherical* maps. Andrews' scheme of classification has subsequently been adopted, in varying degrees, by most recent cartographic scholars.

*Classification of Medieval Mappaemundi by M.C. Andrews*

However, Andrews points out, such attempts at classification in the case of medieval maps will not disclose any distinguishable "line of progress" or "improvement", either in content or in execution. As mentioned previously, medieval maps were more regressive in scientific terms, with a tendency toward symbolic and diagrammatic treatment rather than building upon the geographical and scientific knowledge of the past. Also, today's cartographic scholars are more inclined to evaluate medieval *mappaemundi* more in terms of the author's intent, purpose and context than whether it represented a scientific advancement in geography or cartography,

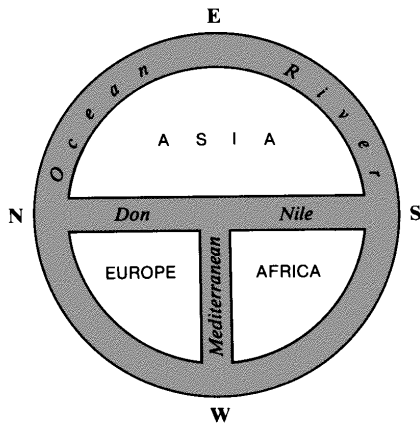
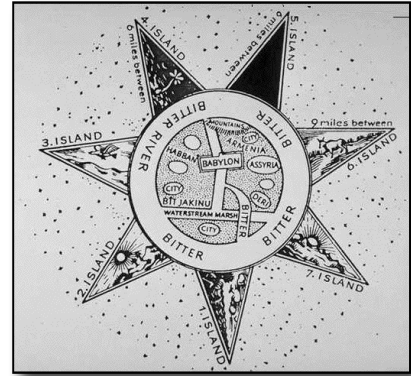


especially since many of the maps from this period were incorporated as illustrations within a manuscript text or as decorative elements in buildings. The classification of medieval

## Introduction

*mappaemundi* does, instead, provide a means of illuminating possible relationships that can be ascertained among maps within a *Family*, or between maps from each *Family*, and thereby throw some light upon the probable derivation of the groups themselves from common ancestors.

The design of the *Oecumenical/Ecclesiastical Family* is based upon the elementary idea of a plane earth extending round the observer in all directions, the result being a view of the known world such as might be obtained from a high mountain top. It is probably attributable to taking the relatively simple methods of local cartography that were common to the earliest inquiries of most ancient peoples, before the development of the mathematical and astronomical sciences, and extending the area/design to include the whole (known) world.



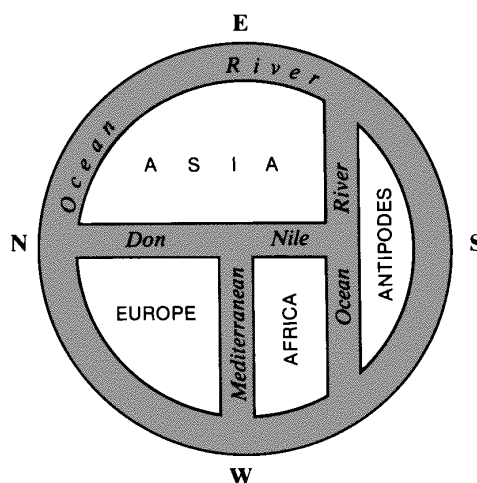
The early medieval maps from this *Family* also lent themselves readily to the exposition of certain biblical traditions, such as the *circuit of the world*, and to later *Ecclesiastical* theories that placed Jerusalem at the world's center. By avoiding the awkward controversial question of the *Antipodes* and antipodean races of the human kind, the *Oecumenical Family* received the approval of the early Fathers of the Church, and were naturally and freely adopted by medieval monastic scribes (the primary source of books before the advent of printing), even long after the sphericity of the earth had been generally accepted. In so far as they represented the earth as a flat, circular disc, an oval, or a rectangle surrounded by a continuous ocean, the *Ecclesiastical* maps of the early medieval period carried on the ancient Babylonian/Greek/Chinese concept of the world and the most primitive mode of its cartographical representation known to us. "For my part," wrote Herodotus in the fifth century B.C., "I cannot but laugh when I see numbers of persons drawing maps of the world without having any reason to guide them; making, as they do, the ocean stream to run all round the earth, and the earth itself to be an exact circle, as if described by a pair of compasses, with Europe and Asia just of the same size." Despite his scorn of the ancient Greek delineation, Herodotus did

not show his generation a better way of drawing its maps (although reconstruction of his description have been attempted, #109). He questioned whether Europe at the north and east was bounded by the ocean, but he stopped short at the question, unable, it seems, to make an alternative suggestion.

This mode of representing the earth and its waters, which the Greek historian condemned, was so old even in his day as to have become part of the universal consciousness. No European map in this style proceeding from the pre-Christian world has come down to us, but its elements, with differences both of simplification and elaboration, are embodied in a

representation of the world and its accompanying descriptive text found upon a Babylonian tablet of the fifth century B.C. (the illustration above is from #103 in this series of monographs).

The efforts of Marinus of Tyre and of Ptolemy at a scientific representation of the world during the first century A.D. failed completely to eradicate this ancient conception from the popular mind (#119). While they and their copyists were drawing their learned maps, projecting to the best of their skill a spherical world upon a plane and applying to the surface thus created measurements of latitude and longitude, tropics, zones, and the Equator, anonymous draftsmen still were carrying on the ancient tradition of cartographical representation, amusing and instructing the ordinary man with a simple and lively picture of the world in which he lived.



It is probable that, along with so much else of worth, the Ptolemaic system was lost to the European Christian world in the centuries following the barbarian invasions of Europe. But though the twilight and the intellectual disintegration might obscure for a time the learned Ptolemaic atlas, the primitive world map persisted in men's memories, so that when the churchmen of the early medieval period sought to display the picture of God's creation to their people they found at hand a living tradition of cartographical representation. It was for them as if Ptolemy had never existed. It is probable, furthermore, that they would have rejected Ptolemy even if they had known of his works (the *Almagest* and his *Geography*), for his maps were built upon the theory that the earth was a sphere, and that was a theory which demanded, for the equilibrium of the sphere, antipodal landmasses in the south and west as counter-weights to Europe and Asia of the north and east. This meant the existence of inaccessible lands and peoples unknown to the Scriptures. Such a condition formed an effective denial of the Master's word that the Gospel would be preached throughout the world and a negation of the doctrine that all men were the fruit of a single creation, fallen through Adam and in Christ made alive.

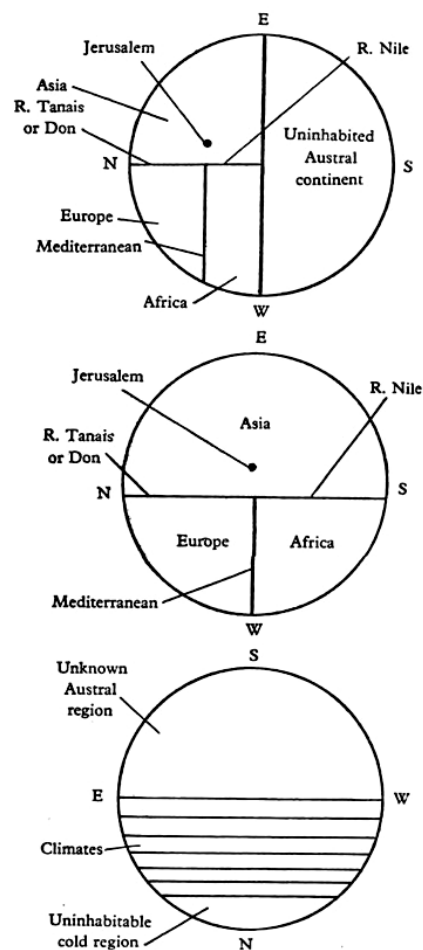
These maps of the ancient world transmitted by the medieval monks, which Andrews places in his *Tripartite Division*, have also been called "wheel-maps" because they were round and because the likeness was further accentuated by their possession of features roughly resembling spokes. This division of the *Oecumenical Family* includes those maps that indicate the three continental boundaries of the habitable world: Africa, Europe, and Asia. These *wheel-maps* appear in one of three basic patterns: T-O, Y-O, or V.

Overall, the most generally adopted pattern, or means of partitioning the world, was by means of a T within an O, popularly known as *T-in-O* or *T-O* maps [*orbis terrarum*]. The outer circle represents the *Ocean River*. Running horizontally, from north to south (these maps were normally oriented with East at the top), is the river *Tanaïs* [now known as the river Don], separating Europe from Asia; while across the Mediterranean, in southward prolongation of the line of the *Tanaïs*, runs the Nile River, separating Asia from Africa. Meeting this line at right

angles, separating Africa from Europe, the long and narrow Mediterranean Sea runs vertically, completing the T within the O. The other two forms of continental partitioning are merely variations on this basic scheme and, at first glance, all three forms seem unworthy of serious consideration, representing productions based upon a scheme fantastically incorrect in content, mode and form. To aggravate their position further, because the *Ecclesiastical* maps probably trace their origin back to the same model, those of one century are much like those of another in both form and content. Their successive repetitions of the same design all but precluded development, reinforcing the view that they played such a small part in the evolution of cartography. But despite its obvious defects, this *T-O* or *wheel-map* of the ancient and medieval world, this picture of the earth and its encompassing waters, is not to be cast aside as utterly lacking in virtue. The more familiar one becomes with it, the less he is inclined to dismiss it as merely quaint. Behind its construction was an idea and a tradition based upon the ancient Greek theory of a continuous, earth-surrounding ocean stream. In these maps, for instance, the Indian Ocean, a narrow sea, mingles its waters with the ocean-stream, keeping alive in this particular a truth perverted by the learned geographers of Alexandria, i.e. Ptolemy, who depicted the Indian Ocean as a land-locked body of water.

It is, moreover, not entirely fair to the *Ecclesiastical* map to suggest, as many have done, that it underwent little development and had little influence upon geographic ideas. Not only did it keep the Indian Ocean open at its eastern extremity, but it continued throughout its history to show Africa washed by the western ocean-stream and the Indian Ocean. This was an Africa twisted uncomfortably to the eastward in order that it might be fitted into the circular form of the map, but a peninsula none the less and by that much a true representation of the facts.

There are other factors to be considered in the evaluation of the circular world picture of the Middle Ages. As will be seen in *Book III*, the follow-on volume of cartographic monographs, the 15<sup>th</sup> century brought a number of maps of this *Family*/category. These later versions of *T-O*/*wheel-maps* began to enlarge the geographic content by crowding into their already confused areas, information which Marco Polo and others had brought back from their eastern travels. The celebrated map in the Stefano Borgia Museum (#237) engraved upon an iron plate in the middle of the 15<sup>th</sup> century and the *Andrea Bianco* map of 1436 (#241) are members of this group, but still more notable is the *Fra Mauro* map, 1459 (#249), in which the Polean data are set forth even to the inclusion of the island of *Zimpagu* [Japan], probably the earliest delineation of Japan upon a European map known to us today.

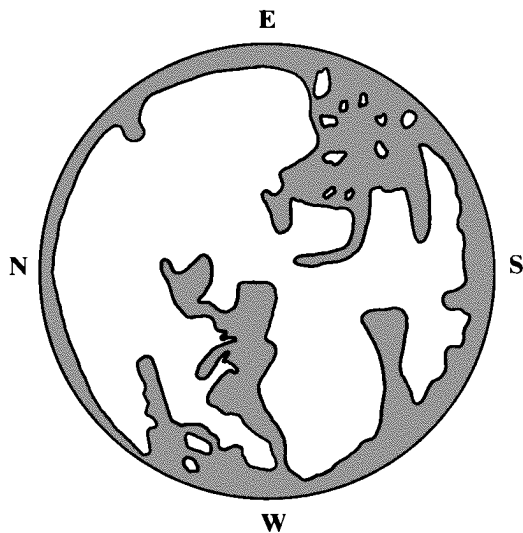




## Introduction

Credit is given these 15<sup>th</sup> century makers of the circular maps for grafting the Marco Polo geography upon their ancient form, but little is allowed them for their delineation of an open Indian Ocean and a peninsular Africa. This small measure of success in delineation, say those who hold the picture-map in scorn, was attained by guess and by chance rather than through the exercise scientific thought, observation and reflection. But, however it came about, there it is, a fundamentally correct expression of popular belief maintained for nearly two thousand years. Many scholars regard this type of map as an inferior production when compared with the Ptolemaic maps and the *portolan* [nautical] charts of the Middle Ages, but if we go back to the Homeric age when it was the only form of world map existing, back, let us say, to the moment of its first construction, we would probably acclaim it as an effective organization of geographic data.

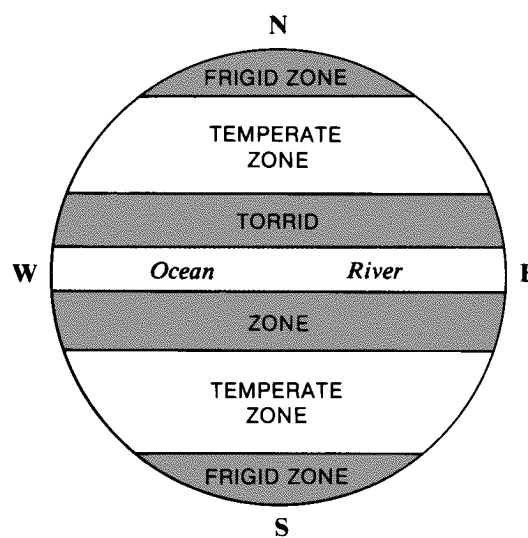
The other major division of the *Oecumenical/Ecclesiastical Family* is what Andrews labels the *Simple Division*. This category comprises many of the earliest, most elaborate, and largest cartographical productions of the medieval period. Included in the Simple Division are the seventh century map of *Albi* (#206); the 10<sup>th</sup> century *Anglo-Saxon* or *Cotton* map (#210), the great wall



maps of *Ebstorf* and *Hereford* (#224, #226) and their smaller 'book' relations; the maps to be found in the *Polychronicon* of Ranulphus Higden of Chester (#232) and in the works of Matthew Paris (#225). None of these indicates the continental boundaries in any arbitrary way, but all follow more or less the configuration of the actual geographical features. It should, however, be noticed that in some of them the *Tripartite Division*, although not formally indicated, has evidently exercised a strong influence upon the design. As it is not possible to reproduce here in these monographs any large map unless on so reduced a scale as to be illegible, the examples selected to illustrate this *Division* attempt to give

the reader some idea of the overall design, as well as some detailed portions that substantiate more than common knowledge of the East.

The second major *Family* of medieval maps classified by Andrews, the *Hemispherical Family*, includes those *mappaemundi* which depict the whole (Eastern) hemisphere, including not only the known, habitable region of the north, but also the parts to the south of the Equator. These regions were designated as 'uninhabitable', if the mapmaker wished to conform to the tenets of the medieval Church, or were represented as the dwelling place of the *Antikoí* or *Antipodes* if he had a mind liberated from religious dogma. In addition, some maps in this *Family* indicate, albeit vaguely, the possibility of the existence of continents in the other (Western) hemisphere, but no very intelligible method of representation seems to have been devised. Perhaps no map designer was sufficiently convinced of their existence, or bold enough to defy tradition by making any more definite reference to lands which could not, according to theologians, have been peopled by the sons of Adam. Be this as it may, the medieval maps of the *Hemispherical Family* are derived from a pre-Christian science, which recognized the sphericity of the earth. The great popularity of the works of Martianus Capella and Macrobius (#20), by whose writings this essentially anti-biblical picture of the world was introduced to students of the ninth century, is sufficient to account for the somewhat surprising fact that maps of this type are to be found as frequently as those of the more orthodox *Oecumenical* design.



Zonal maps, with latitudinal regions set apart on the basis of prevailing climate, had roots in the ideas of Parmenides (fl. c. 515 BCE). Hipparchus (second century BCE) and Ptolemy passed on his theory and it reached medieval textbooks through late classical writers, especially Macrobius (fl. c. 430) and Martianus Capella (fl. 410-39). The former put a zonal map in his commentary on Cicero's *Dream of Scipio* and it was through that book illustration that medieval readers and mapmakers came to know about the five zones with frigid and uninhabitable polar zones, two temperate zones, and a torrid zone around the equator between the two temperate ones. Each zone had a precise size. A variant to the theory added two more zones, also based on latitude. If surviving climate maps are any indication the type was more popular in Arabic-speaking regions. Still over 150 zonal maps have been found from Christian Europe in manuscripts of Macrobius' commentary from the ninth through the 15<sup>th</sup> century. They continued to appear into the 16<sup>th</sup>. The theory enjoyed some degree of popularity even into the modern era. The maps showing climate zones were highly stylized, their purpose to transmit one critical piece of information. They rarely ventured beyond depicting the major divisions and as a result rarely enjoyed the embellishment or the evolution of the more common maps which showed the world divided into continents.

According to Andrews, the majority of medieval world maps of the *Hemispherical Family* are constructed in accordance with what is known as the oceanic theory, attributed to a fifth

century B.C. Greek philosopher, Crates of Mallos, which recognized two oceanic-streams (#113). The “true ocean” encircled the sphere equatorially, while the “popularly accepted ocean” which passed through the poles, was regarded as subsidiary. These two ocean-streams, flowing at right angles to one another, divided the world into four equal landmasses. Some groups of maps in this *Family*, however, give no indication of any equatorial ocean nor, therefore, of any quadri-partite division.

Andrews divides the *Hemispherical Family* into two main branches: the *Oceanic* or *Quadripartite Division* and the *Non-Oceanic* or *Non-Quadripartite Division*. The maps belonging to the first *Division*, which, to judge by the numerous examples that have survived, was by far the most popular in medieval times, and is further classified by Andrews as *Simple* and *Zone*.

The *Simple Genus* includes maps such as those in the *Liber Floridus* of Lambert of St. Omer (#217) and some in the works of William of Conches (#225.1), which depict the whole hemisphere bisected by the equatorial ocean, but do not indicate any division by zones. The northern habitable parts in these maps are often divided in tripartite fashion, but sometimes have no formal divisions. The *Zone Genus* maps present in pictorial form the ancient Greek thesis, attributed to Parmenides, ca. 515 B.C., that the globe is divided into five zones: the central or torrid zone, with its equatorial ocean; the two temperate zones, with geographical features in the northern zone only; and the two frigid zones at the poles, uninhabitable on account of the cold. Examples of various *Species* are to be found mainly in the commentaries in *Somnium Scipionis* of Macrobius (#201), the *Philosophia* and *Dragmaticon* of William of Conches (#225.1), and less frequently in other works. In the *Macrobian* maps, the *Cratesian* scheme is usually more fully illustrated by the inclusion of inscriptions dealing with the oceanic tides. On these maps there can be seen the north and south polar bays, where the waters flowing in different directions met twice daily with a great shock, and in turning back gave rise to the tidal phenomena.

Two curious forms of pseudo-*Zone* maps are to be found in the *De Natura Rerum* of Isidore of Seville (#205) who was more known for his T-O maps. In one of Isidore’s maps the hemisphere is divided by arcs of circles; in the other, which is highly diagrammatic and based upon a complete misconception of mathematical geography, the five zones arranged in pentagonal form around a central flat-earth circle. The essential difference between maps of the *Zone* type and those in which the northern half of the hemisphere is divided into the seven climates of the Greek and Alexandrian geographers has not been sufficiently insisted upon according to Andrews. *Climate* maps, however, have sufficiently well marked characteristics and distinct origin to justify their classification, not only in a different *Genus*, but in a different *Division* from the maps just considered.

Although the southern boundary of the first climate does not always coincide with the Equator, these maps do not, in general, show any equatorial ocean, nor, in consequence, do they indicate any quadripartite division of the globe. *Climate* maps are derived from quite different sources than the *Zone* maps. They are due to the influence of Arabic cosmographers and geographers who preserved the ancient Greek ideas about the world through the “dark ages” when they had been forgotten by western learning. Most Arabic maps (#211 – #214, #221, #222) are not only divided into climate bands, but are placed (i.e., oriented) with the South uppermost at

the top; but no early Latin examples are to be found, as this system was not generally known to students of western Europe until the medieval renaissance of the 12<sup>th</sup> century, when Christian students, with the assistance of Spanish Moslems and Jews, translated many scientific treatises into Latin. No *mappaemundi* have been found in the works of Adelard of Bath, the earliest of these translators, nor in those of Gerard of Cremona, who was the most prolific; but examples, usually mere diagrams, are to be found in the 12<sup>th</sup> and 13<sup>th</sup> century manuscripts of the *Dialogus Contra Judeos* of Petrus Alphonsus of Huesca (Rabbi Moise Shephardi, #201E), and in the *Shaera* of Sacrobosco (John of Hollywood, #261), while a more elaborate, but still later, map occurs in the work of Petrus Alliatus (Cardinal Pierre d'Ailly, #238).

An interesting feature in the *Climate* maps is the prominence sometimes given to the mythical world-center *Arin*. Adopted by the Arabic cosmographers from the Indian philosophers, this 'cupola of the world', which was placed on an island in the Indian Ocean, played an important role in their geographical systems. For through *Arin* passed the Prime Meridian of the Arabs; it was situated midway between China in the east and the *Fortunate Islands* in the west, and it had no longitude.

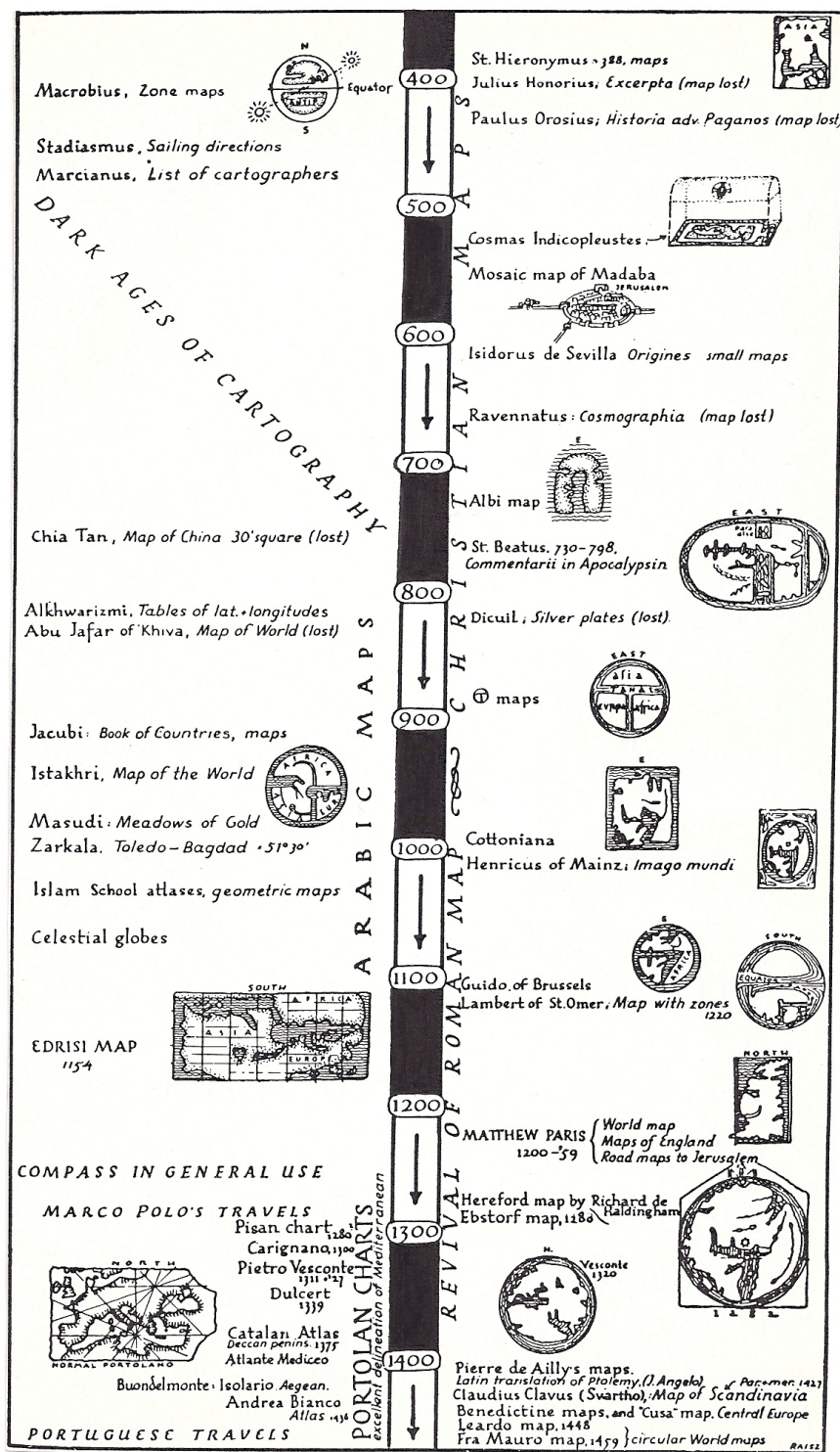
Finally, it must be pointed out that some *mappaemundi*, notably the splendid series to be found in the codices of the commentary on the *Apocalypse* by Saint Beatus of Liebana (#207), spread the known habitable world over nearly the whole of their surface and also indicated an *austral continent*. For, in addition to the three known parts of the world, a fourth part is shown to the south of the central ocean, which, while 'inhabited by the fabulous antipodes, is unknown to us on account of the intolerable heat of the sun'. These maps, therefore, cannot be properly assigned to either of Andrews' main Families, but, partaking as they do of the characteristics of both, must be considered as occupying an intermediate position between the *Oecumenical* and *Hemispherical* types/Families.

In the 13<sup>th</sup> century however, a new genre of cartography suddenly appeared. Initially produced in a number of Italian city-states (Venice and Genoa) and in Majorca, by the Portuguese in the 15<sup>th</sup> century (though possibly much earlier), and later by the French, Dutch, Ottomans, and the English. These maps are commonly known today as *portolan* charts. Far more spatially accurate than their *mappaemundi* counterparts, *portolan* maps were likely secular in origin. Initially comprised of the coastal outlines of the Mediterranean, Black Sea, and Atlantic coasts from Denmark to Cape Bojador in the Western Sahara, later, *portolan*-type charts were made up of other seas and regions such as the Caribbean and the Moluccas. Although made in different city-states and varying in decoration and language, all adhered to certain characteristics, such as their rhumb-line network, markings for natural hazards, toponymy, and scale. Several scholars have debated the most appropriate terminology for this map genre, and a variety of names have been employed, including 'rhumb-charts', 'loxodromic charts', 'compass charts', 'marine charts', and 'nautical charts'. Patrick Gautier Dalché argued that the term 'portolan chart' presupposed that they were based on written *portolani* (medieval textual sailing directions), and instead suggested using the term 'marine charts'.



## Introduction

Many of the splendid examples now known have been preserved because they were especially made for kings, princes, or patrons of the arts, and, being kept in libraries, were not subject to the deterioration and loss to which charts in use onboard ship were exposed.



Time Chart of Medieval Cartography (from E. Raisz)



These nautically-based charts were of a peculiarly practical character, uninfluenced by Ptolemaic or other scientific ideas. Even a cursory inspection of a *portolano* would reveal two things, the accuracy of the delineation and the presence of a multiplicity of criss-cross lines. Being essentially sailing charts, they naturally were concerned almost entirely with coastal forms, with headlands and river mouths, with the adjacent islands, and with seaports. The interior of the countries shown is usually left nearly blank, except for often beautifully executed shields, or banners, emblazoned with appropriate arms or devices. Of their origin little is known. A.E. Nordenskiöld believed that what he termed the 'normal *portolan*' was constructed in the latter half of the 13<sup>th</sup> century from numerous coast sketches. Theobald Fisher and Matteo Fiorini would put back their first appearance to the 11<sup>th</sup> century, and suggest a Byzantine influence; while Dr. E.L. Stevenson finds in them not only the elements of the compass charts, but those of the ancient sailing directions or *Periploi* and of their medieval analogues the *portolani*.

An interesting record has been preserved of the crusade of Louis IX, which states that when, after leaving Aigues Mortes in 1270, the expedition was overtaken by a storm, the pilots brought charts to the king to show him their position. Raymond Lull, writing in 1286, mentions charts used in navigation. The earliest *portolan* charts now preserved are not, however, older than the last years of the 13<sup>th</sup> century, or the first years of the 14<sup>th</sup>. Even at this date, the coasts of the Mediterranean and Black Seas are drawn with that surprising accuracy which is typical of the whole group for the three centuries during which they were produced. Outside the Straits of Gibraltar, the western seaboard of Europe, the northwestern coasts of Africa, and the Atlantic islands are often included, but with less accuracy and with less fixity of form, indicating clearly that these regions had not been mapped for so long a period as the Mediterranean basin. After the great discoveries of the 15<sup>th</sup> century the marine chart was extended in scope by the inclusion of the whole of Africa, with parts of the two Americas and eastern Asia, thus approaching more nearly to the character of a true world map.

The other major characteristic of the *portolani* was the proliferation of lines resembling spider webs. These are interpreted by some scholars as prototypes of the compass roses of modern charts and prove beyond dispute that the *portolani* were indeed based upon compass work. These charts were constructed by means of bearings taken from prominent physical features, and by estimated sailing distances. They were produced for practical purposes by methods that were, while practical, quite unscientific. The nautical cartographer had in fact stumbled upon an insoluble problem when he attempted to depict a portion of the sphere on a plane surface, preserving at the same time a correct outline and true compass bearings. That the distortion was small enough not to interfere to any great extent with practical utility was due to the restricted area being depicted and to its considerable distance from the pole; that it escaped notice was probably the result of observational methods which left much to be desired in accuracy.

Despite the advent and popularity of printed maps in the 16<sup>th</sup> century, and the supersedence of parchment by paper, *portolan* charts and atlases were still hand-drawn on

parchment well into the 17<sup>th</sup> century, and were likely manufactured using the same techniques as four centuries earlier.

The use of nautical charts was, however, almost entirely confined to mariners; they were highly esteemed by pilots and navigators, but were either entirely ignored or looked upon with suspicion by those learned geographers who eventually recognized only the authority of Ptolemy. The publication of Ptolemy's maps in Europe in the early 15<sup>th</sup> century gave them a basis on which to build up scientific charts; and the acceptance of Ptolemy ruled out all the work done by the makers of *mappaemundi*; but the latter, as a picture of the medieval mind, were necessary for a full appreciation of the age, just as maps were indispensable in modern history.

As noted in the preceding discussion on the attempts at classifying medieval *mappaemundi*, to date, scholars have largely sought to analyze the corpus of *mappaemundi* by devising systems of classification. Typologies sort maps into categories based on formal criteria and putative relationships to texts that supplied the foundations of geographical knowledge. Behind every map lies a source map or set of source maps from which it was presumably derived. Attempts to retrace lines of descent from archetype to copy assume that extant works are somehow genealogically related, either through direct filiation or more likely through common ancestry. The focus on family resemblances, however, has tended to obscure the critical importance of difference. In fact, extant maps are highly individualized within the limits of their genre; no two are identical.

The radical diversity of cartographic representation in the Middle Ages goes hand in hand with the individuality of each *mappaemundi* as an artifact. How a map represents space, its operation as image, cannot be divorced from the specific conditions of its realization and function as object. Mapmaking involved more than the selective appropriation and collation of geographic information. Both the task of inscription on a particular support and the circumstances of display in a given context made demands on the cartographic figure itself, conceived and manipulated in relation to codicological structures, architectural spaces, or quasi-stationary installations. As articulated by Marcia Kupfer, "the image of the world, conditioned by the material constraints of the *mappaemundi*, never stood alone. Because *mappaemundi* occurred as text illustrations or double-page illuminations in manuscripts, as monumental decoration in buildings, or as interior furnishings, they belonged *ipso facto* to complex ensembles that circumscribed their consultation, contemplation, or ceremonial presentation. The cartographic figure produced meaning by virtue of its place in a constellation of signifying elements. Surrounded by textual and pictorial matter, *mappaemundi* in turn articulated the experience of the book or space wherein they were inserted."

According to Kupfer, just as there is no generic medieval manuscript or church building, so too can there be no typical map. Each one is as much the product of authorial and artistic intervention as it is that of the proverbial copyist. Even if the goal of medieval scribes and artisans was to replicate a particular model, a dubious hypothesis, the act of transcription from one site to another would inevitably introduce change. Kupfer argues that every *mappaemundi* re-invents the world.

It is thus not possible to accurately generalize the *mappaemundi* of this thousand-year period variously referred to as the “Medieval Period”, the “Middle Ages”, or even the “Dark Ages”. In what 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 surviving *mappaemundi* appears, little innovation is seen in Europe except in the maps of Beatus, despite the renewed interest in natural science; however, considerable cartographic 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* and *Geography* by Ptolemy, that scientific interest re-awakens. The last period, from about 1300 to 1500, stands apart from the earlier tradition of *mappaemundi* and acts as a transitional stage between the medieval and modern worlds of mapping (for examples of maps from the late medieval period, see #227–#263). 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 15<sup>th</sup> century and set the stage for the technical advances of the European Renaissance.

## The Context and Study of *Mappaemundi*

If we survey man’s knowledge of his world at the close of the first millennium AD, around the time of the *Vinland* discovery, the overriding impression is of peoples inhabiting island-civilizations isolated from each other, whether by ocean and desert, or by mutual indifference and hostility. Christian Europe and the Islamic world confronted each other across the waters of the Mediterranean, their mutual enmity acting as a barrier to exploration and knowledge. Of these two dominions, the latter was by far the greater, stretching from the *Pillars of Hercules* to the regions that were mere names in Europe: Arabia, Persia, India. While the Islamic peoples traded with India, China and South-East Asia, the isolation of Western Europe was acute, and the achievements of its only explorers – the Norsemen ignored.

In the Middle Ages, the word *mappamundi* (especially the oral word) was predominant over the image and was prescribed as such by the nature of the biblical narrative and the views of the early church fathers. Saint Gregory the Great stated that pictures were for the illiterate what the Scriptures were for those who could read. What then was the role of the *mappaemundi*, and at what audience were they aimed? Were they merely illustrations, subservient to the text and adding little in the way of information, or were they independently valuable?

The answers to these questions depend greatly on the type of *mappamundi* under discussion. 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 14<sup>th</sup> 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 14<sup>th</sup> and 15<sup>th</sup> 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 19<sup>th</sup> and early 20<sup>th</sup> 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 13<sup>th</sup> century bishop of Acre, specifically mentioned that he found a *mappamundi* to be a useful source of information. Fra Paolino Veneto, an early 14<sup>th</sup> 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 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 12<sup>th</sup> 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 13<sup>th</sup> and 14<sup>th</sup> 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 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 (#242) 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, therefore, 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* (#223), 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 18<sup>th</sup> century: thus an 18<sup>th</sup> century manuscript version of the 13<sup>th</sup> century Spanish geography, the *Semeianca del mundo*, was entitled *Mapa mundi*. The late 12<sup>th</sup> to early 13<sup>th</sup> century chronicler Gervase of Canterbury described a gazetteer of religious houses in England, Wales, and part of Scotland as a *mappa mundi*.

Two dominant themes relating to the geographical utility of medieval world maps can be identified in the literature since the late 19<sup>th</sup> 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 12<sup>th</sup> 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 a 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. The historian 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 13<sup>th</sup> 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 the historians W.L. Bevan and H.W. Phillott introduced as early as 1873, draws attention to the historical or narrative function of the medieval world maps. This theme has recently 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 number of secular places of historical interest are found, such as Olympus, Taprobane, and Pergamon, together with several secular places of particular interest at the 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 10<sup>th</sup> 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.”

Hugh of Saint Victor (c. 1097-1141), writing on Noah’s Ark and its form and mystical function, offered the single discussion from the Middle Ages of what it meant to make a map. He repeated existing conventions on what was to be included and how the relative importance to Christian history of events or places was to be shown by their size, a tradition which dated back to illustrations for works of the seventh century Spanish thinker and religious official, Isidore of Seville (c. 560-636, #205). Hugh said a world map should be in the shape of the Ark, “... his instructions clearly being more related to the mystical functions of the map than to any geographical use.” The map, imbedded in what was a work of contemplation placed in a cosmic diagram, was to offer readers or anyone who heard or saw the work an aid to the study of *Scripture*. It was a container of knowledge with everything important, everything worth remembering. Hugh articulated and demonstrated the function of a map commonly understood among makers and users alike: passing on sacred knowledge visually.

Many surviving medieval maps appeared as illustrations in books. Often the purpose was to illustrate the text and so project history and typically Christian history, onto the image, to make a static surface tell a dynamic story. These maps showed only places of interest, which meant almost invariably religious/historic interest, and that further reinforced their primary didactic function. With such an ambitious program it would seem churlish for critics to complain that the rich surfaces that typify many medieval world maps do not reflect in a recognizable way the contours of the earth. It would be wrong to claim that it was a matter of '... medieval otherworldliness taken to the point of indifference to the realities of the physical world and to condemn the results as some artifact of a non-existent 'medieval mind.' The artists who made maps in the Middle Ages had a purpose different from their modern counterparts and their products had different functions. Their goals affected what they put on maps.

Hugh of Saint Victor's ideas had their origins in the fifth to the seventh century when the Church Fathers exerted significant influence on the direction taken in the transition from classical to medieval and Christian mapping. Depictions of the world were put to work explaining and elaborating what Christians knew. Subsequently, from the eighth through to the beginning of the 12<sup>th</sup> century there appears to have been a dramatic increase in map production. It began with the revival of learning in the reign of Charlemagne. The newly crowned Roman emperor apparently commissioned a large world map, probably never completed and now lost. As in other aspects of culture, in cartography the Carolingians served as preservers of various aspects of late classical thinking and practice. Carolingians connected the making of world maps with the proper calculation of the date of Easter and so with astronomy and proper Christian practice. That association of finding the date of the most important Christian festival with making maps continued into the late Middle Ages. In the 12<sup>th</sup> and 13<sup>th</sup> centuries, as part of a general flowering of learning, map making expanded even more, swept along in a more general cultural stream and heavily effected by contemporary thinking about science in its various forms.

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 European world. Medieval literature and the *mappaemundi* both mirrored this classical symbolism 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 transitoriness 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 (#226), 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 the #205 images).

With an obvious exception in the curious anthropomorphic maps of Opicinus de Canistris (#230), the Cotton map (#210) 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 13<sup>th</sup> 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 13<sup>th</sup> century, thus joining other strong evidence that seems to controvert the hypothesis of Charles H. Hapgood in his *Maps of the Ancient Sea Kings: 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 Cortesão 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.

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 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'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 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.

This form of world map has been used to support the view that the world was believed to be flat. However medieval thinkers at least after c.1150, were familiar with the Ptolemaic system of a spherical cosmos centered on a spherical earth. This view became universal and orthodox, and the circular disc-like earth of the *mappamundi* should really be understood as no more than a graphic convention. The other well-known symbol of the earth, the ceremonial orb held by the monarch, was plainly a sphere, but the techniques necessary for representing the spherical earth on paper were quite unknown. By drawing on legend and tradition, the *mappamundi* gave an



impression of a breadth of geographical knowledge that was actually spurious: the names India, China and Africa appear on the map, but their geography and character are really quite unknown. European knowledge of the world really stopped at the Vistula, the Black Sea, the Syrian desert and the coastline of North Africa. In particular - and in spite of the Norse voyages - the Atlantic as the world's western boundary was absolute: beyond the *Pillars of Hercules* lay only the mythical lands or the islands of legend - *Atlantis*, the *Hesperides*, *St. Brendan's Isle*, *Avalon* or *Lyonesse*.

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. Had the *Ebstorf* map been examined with this in mind and the results properly documented before its destruction in 1943, some further important clues might have been revealed.



Post-classical Latin texts transmitted to medieval geography ancient Greco-Roman traditions, including the concept of the earth's spherical shape, first known to be promulgated by Crates of Mallos in ca. 180 B.C. (#113). It is now clear that nearly all European medieval scholars conceived of the earth as a globe. 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 as presented in the sixth century *Christian Topography* of Cosmas Indicopleustes (#202). It is important to realize that Cosmas's 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*".

According to the Crates theory, the earth was divided into unbridgeable quarters and it held four great landmasses, conceived as self-contained and non-communicating island-worlds. Although only the portion in the northeast quadrant of this sphere was then known to be inhabited (the *oecumene* [known habitable world]), the possibility had to be entertained that the three other sectors were likewise populated. A version of this Hellenistic model circulated in the Middle Ages through widely read treatises composed in the early fifth century, Macrobius' *Commentary on the Dream of Scipio* and Martianus Capella's *Marriage of Philology and Mercury*. Both authors, in conformity with their classical sources, designated the habitable region of the globe's southeastern quadrant by the name *anteoikoi*, reserving the term *antipodes* for the corresponding area of the southwestern quadrant diametrically opposite the *oecumene*. Similarly, the inhabitants of the *anteoihoi* had as their antipodes the globe's northwestern quadrant. Just as the sun's burning heat made the wide equatorial zone between northern and southern hemispheres impossible to breach, so too the polar zones were impenetrable on account of the freezing cold.



A great many medieval *mnappaemundi* dependent on this heritage depict in plan the curved surface of the terrestrial sphere sliced longitudinally so as to show the eastern half of the northern and southern hemispheres. Parallels of latitude delineate global climates. By far the most common scheme defines five zones according to degrees of heat and cold: two frigid polar



zones, two temperate zones to which habitation was necessarily confined, and a central, torrid belt through which flowed the equatorial ocean. Alternatively, latitudinal bands in the northern hemisphere demarcate seven *climata* defined by celestial phenomena, including the length of the longest day. Topographic features pertinent to the *oecumene* in the northern temperate zone often supplement the hemispheric view of the five zones. The quantity and quality of topographic description ranges widely, from the utterly minimal naming of bodies of water to the addition of numerous legends and pictographs for mountain ranges and cities.

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 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.

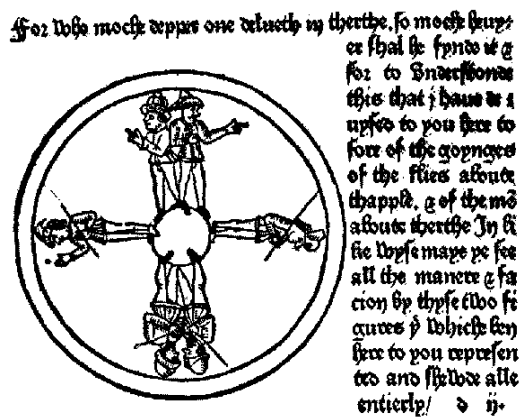
Despite the difficulties of literal biblical interpretation, most early fathers of the church agreed that the earth was a sphere. Augustine specifically mentioned it at least twice. Saint Augustine, *De civitate Dei* 16.9: "*They fail to observe that even if the world is held to be global or rounded 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*”.



*Demonstration of the Earth's  
 Sphericity in the 13<sup>th</sup> 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: 8.2cm.

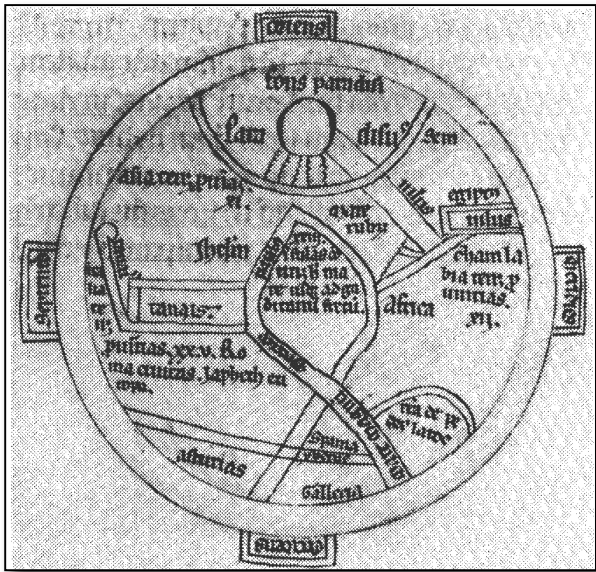
From a printed edition of *Image du  
 monde* (London: Caxton, 1481)

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 Astronomicum* 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.



*The Nile River as an extension of the four Rivers of Paradise.*

*This schematic T-O map, from a 10<sup>th</sup> century manuscript of Isidore of Seville, shows the Nile River with two sources: one in Paradise and the other in Africa. Diameter of the original: 11.5cm.*

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 12<sup>th</sup> 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, 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 (#215C) seem to have been

constructed on “projections” approaching the *azimuthal logarithmic*, where the central part of the map is enlarged in scale.

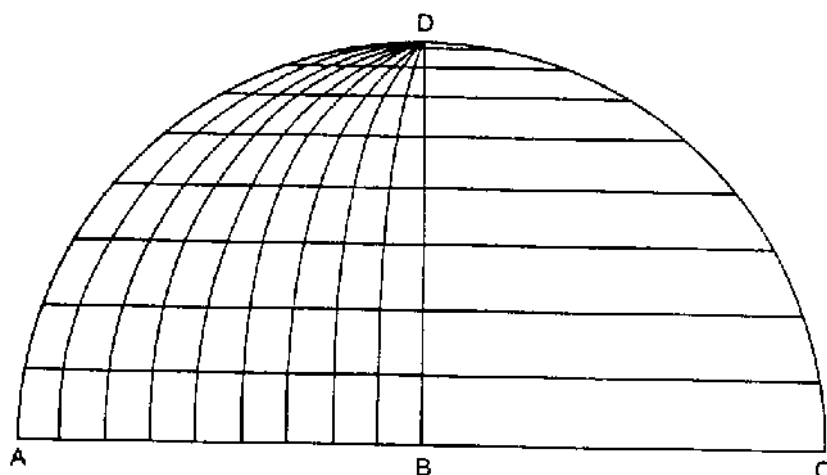
Deliberate systems of projection, however, that reveal a conscious knowledge on the part of their compilers of a transformation of coordinate positions, are not found in the Middle Ages until the time of Roger Bacon. In his *Opus majus* (1268), Bacon describes a map, which has not survived, that he appended 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.

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 12<sup>th</sup> century and the *Geography* in the 15<sup>th</sup> (#119). 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 11<sup>th</sup> 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.

Although both the *Almagest* and the *Geography* remained unknown to the Western medieval world before the 12<sup>th</sup> century, the concept of longitude and latitude had nevertheless filtered into northwestern Europe by the early 11<sup>th</sup> 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.



*Reconstruction of Roger Bacon's Map Projection*

*In this 13<sup>th</sup> 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 AC). 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.*

There had also been attempts to measure longitude in the 11<sup>th</sup> and 12<sup>th</sup> centuries. Petrus Alphonsus (1062-1110) gave an explanation of the relation between time and longitude in his *Dialogi cum Iudaeis*. Walcher's observation of lunar eclipses on 19 October 1091, on 18 October 1092, and during 1107-1112 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 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 following discussion is taken from the *Exploring Mercator's World* article "Flat as the Earth" by Jeffery Burton Russell (Volume 6, Number 6, 2001). Medieval maps were flat - but so are maps in world atlases today. The first still-extant globe of the earth is that of Martin Behaim

(#258), made in 1492 before Columbus' voyage; more medieval globes - perhaps many more - are thought to have existed. The cliché that "Columbus discovered that the earth is round" is a lie popularized by the American writer Washington Irving in 1837.

As stated above, that medieval European people knew the earth to be spherical has been demonstrated as a fact by historians of medieval science for more than half a century. No educated person in the European Middle Ages (roughly defined as A.D. 500-1500) believed the earth was flat. The evidence is as overwhelming as historical evidence can be. Uneducated people may have assumed a flat earth, if they thought about it at all. But a reasonable number of Europeans in the Middle Ages were educated: literate, numerate, many with some knowledge of astronomy (not astrology), and logic, which were taught in the schools.

Even among educated people, interest in the shape of the earth was not high, but they would have heard that it was a globe, and none of them is known to have disputed it. Interest in geography in the Middle Ages was mainly practical or theoretical. Travelers wanted a road map or a sea chart showing how to get from Oxford to York, say, or from Lisbon to Genoa. Many such medieval maps of land and sea exist, but they are only a little more relevant to the question of the earth's shape than a street map of Seattle is to Stephen Hawking's universe. Additionally, philosophers and theologians wanted to know what God's universe looked like and how it functioned (the same desire that eventually sparked the great expansion of science in the 17th century). Some of these philosophers were interested in describing the globe scientifically, both the parts and the whole.

Cosmology was certainly geo-centric before Copernicus (1473-1543), but geo-centricity and sphericity are two different questions, both scientifically and historically. Educated European medieval people assumed that the earth was the shape of a globe, just as they assumed that the earth was the center of what is now called the "solar system". About a hundred writings dealing with the earth's shape that would have been known in medieval times have so far been identified. Two are ambiguous, and two assert that it is flat. Of the latter, Lactantius, in the fourth century, was considered a heretic and rarely read; the other, Cosmas Indicopleustes, in the sixth century (#202), was not translated from Greek before the 15<sup>th</sup> century and had no discernible influence on medieval ideas. The remaining 96 % took the globe for granted. None felt the need to argue with flat-earthers, for the simple reason that none existed.

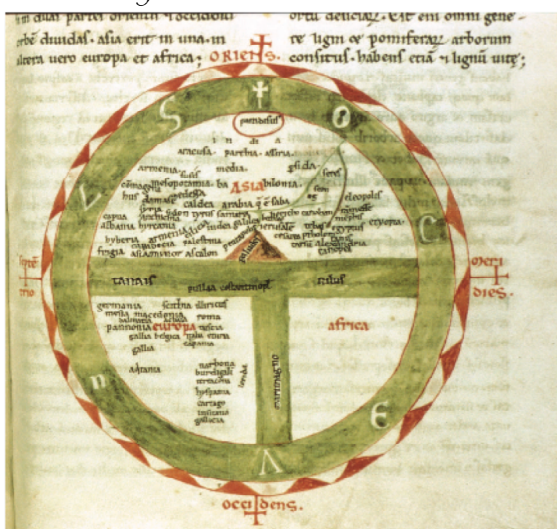
Medieval Christian thinkers also had no trouble reconciling a globe with the Bible. For one thing, the Bible is virtually silent about the shape of the earth: There was and is no explicit biblical concept of the earth's shape for medieval people to either accept or reject. For another, medieval people, unlike some modern fundamentalists, knew when to take the Bible metaphorically rather than literally. Metaphorically is how they took the extremely few, differing, and highly ambiguous biblical references that may suggest a flat earth.

Despite the evidence that few educated medieval people thought the earth was flat, the fallacy that pre-Columbian Europeans thought that the earth was flat continues to be widespread and repeated in many schools and popularized accounts based on biased and outdated sources (for example, Daniel Boorstin's 1983 book *The Discoverers*). Perhaps the main points of evidence need restating.



The medieval word for the world, in the sense of the entire earth, was *orbis terrarum* [the globe of lands]. Three-dimensional artworks show the earth as round; for example, medieval rulers holding symbols of their power carry orbs surmounted by crosses.

Medieval astronomers and geographers, though not known for the breakthroughs characteristic of the 17<sup>th</sup> century, refined and improved on the Greek and Roman view of the earth as a globe, a view completely dominant after the fourth century B.C. Numerous medieval treatises *De sphaera* [About the Sphere] demonstrate their knowledge and interest in the globe. Of course, any ordinary navigator in the Middle Ages would have run aground trying to sail very far on a flat earth. They knew that boats disappear from sight behind the horizon as they sail out from land and appear over the horizon when coming back. They also knew that different stars are visible at different latitudes; latitudes, as opposed to the much more difficult longitudes, had been closely calculated. The earth's shadow on the moon during lunar eclipses was observed.



Many medieval maps survive, and though their details are often crude and inaccurate by modern standards, the calculations of medieval geographers and astronomers indicate how medieval scientists and philosophers viewed the earth and its dimensions. Many variants exist, but in a typical medieval scheme the earth is at the center of the universe. It is a globe around which the spheres of the moon, planets, sun, and stars rotate. Schematically, it can be divided, like any globe or ball, into four quarters. The Eurasian-African landmass is set in the sea of one of

these four quarters. The other three quarters may be entirely sea or may have lands on them. If they have lands, the breadth of the ocean is so great that passage between them is impossible. If they do not have lands, then the sea runs west all the way from Portugal to Japan. The earth's globe is also divided into climatic zones: the Arctic and Antarctic circles are mapped, as are the tropics of Cancer and Capricorn (see #201). Each hemisphere has its counterpart, of course, as does each quarter. Inhabitants of any of the quarters, could they descend to the center of the earth, would meet at the center. The quarter diametrically opposite to the Eurasian-African landmass is called the antipodes [meaning "opposite feet"].

Both medieval and modern writers have been confused by the notion of the antipodes. The Latin antipodes can refer either to the region or to its inhabitants. In the eighth century Saint Boniface reproached a contemporary, a monk named Vergil of Salzburg, for believing in the existence of antipodes. But Boniface was not rejecting the spherical shape of the earth, as many writers in the 18<sup>th</sup> through the 20<sup>th</sup> century believed he was doing. He was rejecting the idea that antipodeans, inhabitants of the antipodes, existed. This rejection was based on a confusion of the theological with the geographical. Boniface believed that the impassable ocean stood between all humans, being descendants of Adam and Eve in the Middle East, and the lands

beyond the oceans. Boniface's blunder is not so startling as that of 19<sup>th</sup> and early 20<sup>th</sup> century historians who professed themselves superior to the eighth-century writer yet fell into a similar confusion and argued that Boniface objected to sphericity. The incident between Boniface and Vergil thus became one classic touchstone for the flat earth misconception.

Another source of confusion are medieval tripartite maps (see #205), showing on a two-dimensional surface the earth divided into three parts: Asia (one half) Europe (one quarter), and Africa (one quarter). At the center of these maps is Jerusalem, leading historians to falsely assume that medieval people believed that the earth was a flat disc centered on Jerusalem. These



recent writers are not much to be blamed, because to understand what the tripartite maps really mean requires stepping out of a scientific world view into a metaphorical world view more akin to poetry. The maps were intended to illustrate Jerusalem as the spiritual and moral center of the earth; they were not meant to be taken in a literal geographical sense.

Not only did medieval people understand the shape of the earth, some of them came extremely close to estimating its actual diameter and circumference. One school worked on refining Eratosthenes' figure of 250,000 *stadest*, very close to the modern figure of 40,000 kilometers [24,854 miles, see

#112]. The other school worked on refining Ptolemy's figure of 180,000 *stadest*. Eratosthenes' view dominated; that school, assuming that the ocean ran unbroken from the Azores and the Canaries to Japan, viewed it as an impassable obstacle to a westward voyage to the Indies. But toward the end of the Middle Ages some writers revived and preferred Ptolemy's figures. The differences led to the bizarre calculations by Columbus, whose courage and determination to promote both Christianity and trade (in addition to his own wealth and reputation) led him into a strange showdown with those who thought he could not succeed.

The arguments of Columbus' opponents in the 1480s and 1490s had mostly to do with the circumference of the globe and the width of the ocean, and nothing whatsoever to do with the shape of the earth. No one entertained the fantastic fear of sailing off the edge of the earth. Rather, the opponents argued that the ocean was too vast for a ship to sail west to Asia without all perishing of thirst and starvation, a dangerous gamble on which to risk life - and the royal treasury. It was quite a reasonable argument, and Columbus had to work hard to overcome it. He accomplished this by scientific fiddling, political luck - and something nobody expected.

The scientific fiddling was prolonged. First, Columbus chose Ptolemy's smaller earth against Eratosthenes' larger (and by modern standards more correct) earth. Next, he chose an argument by the 14<sup>th</sup> century theologian and politician Pierre D'Ailly (#252) that the Eurasian landmass, rather than occupying only a half of the Northern Hemisphere (180 degrees), actually

occupied 225 degrees (versus 135 degrees for the sea). He then argued that Marco Polo's travels showed that the landmass stretched 28 degrees more, and that Japan lay 30 degrees east of China, reducing the ocean to 77 degrees. Next, he subtracted 9 degrees of sea for departing from the Canaries rather than from Spain or Portugal. Finally, he decided that D'Ailly's original estimate was 8 degrees too small, and voila: 300 degrees of land versus 60 degrees of sea. Finally, Columbus switched Arabic miles into shorter Roman miles. He audaciously ended up with a figure for the sea's breadth equal to about 4,450 kilometers [2,765 miles], about one-fifth the actual distance of about 22,000 kilometers [12,670 miles].

Not many believed such preposterous calculations. But Columbus was in political luck. The Turks were blocking the land routes to Asia, the Portuguese were exploring and developing the coasts of Africa, and the Portuguese and Spaniards were locked in a commercial and political rivalry. The Spaniards had just defeated the Muslims in Spain and expelled the Jews, and now they were eyeing new ways to expand their wealth and power. So King Ferdinand and Queen Isabella approved the crazy adventure, and in 1492 Columbus set sail across the Atlantic.

Then came the unexpected, one of the greatest pieces of luck in all of history: On 12 October 1492 Columbus blundered into the Americas under the mistaken impression that he was encountering the East Indies. Otherwise, he and his crew would surely have perished as the scholars had predicted.

But when and why was the flat earth fallacy invented, and why is it generally believed today? Copernicus was certainly not to blame. When he condemned the geocentric opponents of the heliocentric system as being as wrongheaded as those who once asserted that the earth was flat, he could cite only the one flat-earthier that he knew of: Lactantius, who was, as Copernicus said, "hardly an astronomer." Neither Copernicus nor Galileo had to contend with a single flat-earthier anywhere. Hints of the flat error exist as early as the 15<sup>th</sup> century, through Thomas Hobbes, Thomas Campanella, Francis Bacon, Heribert Rosweide, and Bernard de Montfaucon, but they are oblique. The earliest flat-out flat error I have found so far is from John Wilkins (1614-1672), a scientifically inclined clergyman. Thomas Jefferson mentioned it in an offhand manner in his notes on another subject. The error was promoted by Thomas Paine (1737-1809), the influential propagandist for revolution and agnosticism at the end of the eighteenth century. Paine mocked those who "continued to believe for several centuries (and that in contradiction to the discoveries of philosophers and the experience of navigators), that the earth was flat like a trencher, and that man might walk to the end of it." There were no such people. But Paine's mention of Vergil indicates that he was drawing upon an earlier source:

"Vigilius [sic] was condemned to be burned for asserting the antipodes, or in other words that the earth was a globe." Vergil, by the way, was not burned, or even condemned, or even formally censured.

What happened to the flat error after 1794, when Paine's book was published, is fairly clear. It was popularized in France by Antoine-Jean Letronne (1787-1848) and in the English speaking world by Washington Irving (1783-1859). Irving was the author of the beloved *Headless Horseman* and of a number of fraudulent and heavily fictionalized histories of New York City, George Washington, and Christopher Columbus. Irving invented the still widely believed

melodrama of Columbus standing, a lone hero of science, against the bigoted and ignorant courtiers and clergy of the Council of Salamanca, who told him the world was flat. Irving's account of this nonexistent council is fiction, but the fiction caught on with those wishing a handy stick with which to beat the Catholic Church and the "ancients"; we always like to believe that earlier people were stupider than we are. For example, the Egyptians were not intelligent enough to have built the pyramids, therefore extraterrestrials must have done it.

This silliness would probably have faded away but for the appearance of something else no one expected: the theory of evolution. In the early 19<sup>th</sup> century the notion of slow Darwinists assumed that the account of Creation in *Genesis* was supposed to be a literal, scientific, physical account of the beginning of the world, and because they believed the Bible to be without error, they had to reject evolution as false.

The supporters of evolution, apparently by then already believing Irving's tale, claimed that the opponents of evolution were just as stupid as medieval people who allegedly thought the earth was flat. From there, the flat lie found its way into textbooks, stories, and even encyclopedias, where it fit so nicely into what else we know - most of it false - about the European Middle Ages.

One glance at a map developed at the time of the Crusades reveals a map that seems unrecognizable to the modern student. This medieval European world is a flat, circular disc, centered on the city of Jerusalem and populated with the monstrous and the magnificent. The land is distorted, the seas deformed and the rivers displaced. When John Kirkland Wright suggested that, 'It is a mistake to regard accuracy as the goal of the medieval mapmaker', this conclusion seems all too obvious. However, although these maps serve a different purpose to most modern day maps, this does not mean that they are, in themselves, inaccurate.

The European medieval maps, be they embedded in books or hung on walls, were more than simple decoration. They allowed the viewer to see the world from two angles. The first was from above, looking down at a number of fixed topographical features. The second was at a view from a slight perspective, the mapmaker drawing oversized objects, such as cities, to a perspective angle rather than flat on the map. These chorographic and didactic images convey a range of information to the viewer. The complexity of the two angles creates an abstract otherworldly view. It mixes topography with past and future history, making the map both a temporal and a geographical entity. This production of a dual view stretches back to antiquity; Ptolemy named it as *Chronographia* in the second century CE (#119). The map was, like many other things in mediaeval Europe, built upon an ancient framework. They were complex religious, political and cultural tools.

## Borders.

You will notice on the maps/reconstructions from both the ancient and medieval periods that country boundaries (and even continental boundaries) were displayed differently than today, sometimes even conflicting or confusing as to what area is being defined. As today, but even more so in the distant past, country boundaries were "flexible" and constantly changing. To establish and maintain the sovereign boundaries of countries, the ruling power was required to continually



“enforce” the integrity of those boundaries by force. The idea of establishing, recognizing and honoring the integrity of “sovereignty” is a relatively recent concept. Therefore, if country (or continental) boundaries are displayed on these early maps, they are rather vague and/or not universally accepted. Obviously in ancient times there were no “countries” as we define them today, only various size settlements that eventually grew into vaguely defined city-states, controlled territories, etc. Examples include Babylon, Troy, Thrace, Sparta, Phoenicia, Egypt, Bactria, Hyrcania, Sogdiana, etc.

On the ancient and medieval maps place-names are given for general geographical areas/regions, without any explicitly drawn-out borders/boundaries, such as *Gallia*, *Germania*, *Hispania*, *Seres*, *Scythia*, *Assyria*, *Syria*, *Persia*, *Ethiopia*, *Macedonia*, *Arabia*, *Albania*, *Armenia*, *Phrygia*, and *India*. On these early maps, such political areas were not much differentiated from the levels given to the “continents” of *Europa*, *Asia* and *Libya* [Africa], especially on the medieval *Macrobian* and *Isidorean T-O* maps (#201, #205). Some cities received the same emphasis as these larger entities, such as Rome, Babylon, Constantinople, Jerusalem, Ravenna and Antioch. Many of these political areas became known as “empires” encompassing large, vaguely defined areas.

Some maps were merely trying to identify the race or group of people that occupied a particular area, such as the *Celts* and *Ethiopians*. Also the very fact that country boundaries were/are constantly changing with shifts in political/military power. Other areas, such as the island of *Taprobana*, are not identified as “countries”, “continents” or cities. Most recently the issue of Crimea is an example of the rapidly changing world map, not to mention the tremendous changes after the fall of the Soviet Union, World War II, the Ottoman Empire, the European Colonization period, the Mongolian invasion, the Roman Empire. During the decline of the Roman Empire, Europe entered a long period of change arising from what historians call the “Age of Migrations”. There were numerous invasions and migrations amongst the Ostrogoths, Visigoths, Goths, Vandals, Huns, Franks, Angles, Saxons, Slavs, Avars, Bulgars and, later on, the Vikings, Pechenegs, Cumans and Magyars.

From the seventh century, Byzantine history was greatly affected by the rise of Islam and the Caliphates. Muslim Arabs first invaded historically Roman territory under Abū Bakr, first Caliph of the Rashidun Caliphate, who entered Roman Syria and Roman Mesopotamia. Under Umar, the second Caliph, the Muslims decisively conquered Syria and Mesopotamia, as well as Roman Palestine, Roman Egypt, and parts of Asia Minor and Roman North Africa. This trend continued under Umar’s successors and under the Umayyad Caliphate, which conquered the rest of Mediterranean North Africa and most of the Iberian Peninsula. Over the next centuries Muslim forces were able to take further European territory, including Cyprus, Malta, Crete, Sicily and parts of southern Italy. In the East, Volga Bulgaria became an Islamic state in the 10<sup>th</sup> century.

In medieval times, due to lack of border demarcations and the rule of force, few borders were fixed for long, or could be even approximately determined. Consequently, most medieval maps lack bordering lines between countries which are shown just by mentioning their names somewhere in the area they occupied.

## The Oceans.

The following is excerpted from an article by Leonid S. Chekin, *The World Ocean in Medieval Cartography*, in: *History of Oceanography. Abstracts of the VII International Congress on the History of Oceanography*, Kaliningrad University Press, 2003, pp. 16–21. In the early fifth century, Ambrosius Theodosius Macrobius (#201) presented a global view of the Ocean in his *Commentarii in Somnium Scipionis*. In many surviving medieval manuscripts of this work, starting in the ninth century, we find maps that illustrate the following geographical ideas. The Earth is subdivided into five zones. Oceanic currents originate in the middle torrid zone. In the east and in the west each of the currents divides into one northbound and one southbound stream. The streams violent collision around the north and south poles results in ebbs and flows. Our known world thus becomes one of the four “islands” on the globe, which corresponds to the ideas of Crates of Mallos the second century BC (#110).

The medieval *Macrobian* maps show two of these four “islands” in the eastern hemisphere. Our inhabited land is in the north and another “island”, in the south. There are four relevant legends around the circumference of the Ocean: “the Ocean turns from the east to the north”, “the Ocean turns from the east to the south”, “the Ocean turns from the west to the south”, and “the Ocean turns from the west to the north”. There is an excellent late 10<sup>th</sup>, or early 11<sup>th</sup> century example of a *Macrobian* map in the Russian National Library in St. Petersburg.

A map drawn approximately at the same time as the St. Petersburg *Macrobian* map, presumably by Abbo of Fleury, represents one of the further stages of the development of this cartographic type. The Ocean divides the map into three latitudinal parts. The northern part shows the coastlines of our world, the southern part is empty, while the middle part is the *Torrid Zone*, washed by the Ocean on the both sides. The standard legends of the “*Ocean turns*” type are supplemented by the data about the length of the quadrant taken from Macrobius. The ocean at both poles has legends: “*collision of the sea from both directions*”.

The outstanding representative of the *Chartres* philosophical school, Guillaume of Conches also elaborated on Macrobian ideas in his *De Philosophia mundi* (between 1125 and 1135) and *Dragmaticon philosophiae* (1145), suggesting in particular that the mountains on the Ocean’s floor influence the flow of oceanic currents. Some of the manuscripts of these works contain maps with conventional signs for the currents and/or legends of the type of “*the Ocean turns*” but usually lack zonal subdivisions.

Most of the other types of medieval maps show only the tripartite world of Asia, Europe and Africa, encircled by the World Ocean. The Ocean was sometimes named after the nearby coastal regions: for example, *Gallic*, *Germanic*, or *Scythian*.

Geographers and mapmakers identified several gulfs in the Ocean. The largest gulf was the Mediterranean Sea, and many maps show three other gulfs of the Ocean, namely, the Caspian Gulf, the Indian or Persian Gulf, and the Arabian Gulf or the Red Sea. Often the *Macrobian* maps also show the four gulfs, which, according to Macrobius, are the Mediterranean Sea, the Red Sea, the Indian Sea, and the Caspian Sea. The concept of four oceanic gulfs was undermined in the 13<sup>th</sup> century. William of Rubruck was the first Western European to argue, based on his own observations during his travels to Mongolia in 1253 – 1255, that the Caspian Sea was



enclosed. It appears as such on the marine charts of the 14<sup>th</sup> century. The maps that served as the illustrations to the late medieval manuscripts of *Geographia* by Claudius Ptolemy show both the Indian Sea and Caspian Sea as landlocked.

Both the maps of the tripartite world and those displaying the whole “Macrobian hemisphere” most often show only a rim of water around the circle of lands. This convention of medieval cartography might have contributed to the underestimation of the expanse of sea and thus was a reason for Columbus’ travels. Some of Columbus’ contemporaries made the same error of miscalculating the length of the westward travel to the Orient. One of those was Hieronymus Münzer, a medical doctor and humanist scholar from Nuremberg, who authored one of the earliest printed maps of Europe. In 1493, he addressed a letter to the Portuguese king João II, in which he argued that the eastern coast of Asia could be reached from the Atlantic coasts of Europe and Africa within several days (*brevibus diebus*). He based his argument on the experience and trustworthy information that he contrasted with “fantasies” of Alfraganus (the ninth century Central Asian astronomer and geographer al-Farghani) and other “inexperienced” people, who tried to prove that the Ocean covered three quarters of the world. The rim of the Ocean in medieval maps may reflect the archaic view of the Ocean as a river. But it is often possible that the map “*designers saw no need to depict the great portion of the globe that was merely water.*”

Medieval cartography was closely related to historiography. Mapmakers were focused on humanity and its history, interpreted as the history of the Salvation. As a result, the sea loses its space on maps due to its relative unimportance. While Columbus and Münzer needed additional proofs for the narrowness of the Atlantic, it seems that the main reason for the medieval mapmakers not to depict a wider expanse of the Ocean was the need to save writing material.

The Ocean played a role in the history of the Salvation because of its islands, towards which one could navigate, though with a considerable risk. The dangers and remoteness had their appeal for spiritual travelers. The highest degree of monastic fulfillment for the Irish sea pilgrims, who were the first settlers in Iceland and other islands of the Atlantic, was to leave their monastery for the wilderness and deserts of the distant lands.

Other distant islands could be inhabited, though often by wild and monstrous people. The “islands of the nations” had an eschatological connotation in the Bible. As such, they represented the last frontier, where such missionaries as St. Ansgar could bring the word of the Gospel. His *Vita* explicitly refers to the words in the book of Isaiah (49:1 – 7) about the islands, the people far away, and the extremities of the Earth. Those words provided St. Ansgar with motivation to go to Scandinavia, which in the early Middle Ages was considered a group of islands.

The Ocean on Western European maps represented the frontier of all things human, and was the transition stage between life and death. A recently discovered map reveals this idea in a rather complicated manner. The map was created in the South of Germany in the second half of the 12<sup>th</sup> century and serves as an illustration to the *Navigatio Sancti Brendani*, a fictional travel narrative, composed not later than the 10<sup>th</sup> century. A rectangular *Paradise* on the map touches only slightly the globe on the other side of the North Pole. According to the scholar who provided

a detailed analysis of the map, the *Paradise* is “a transcendental place with a very loose connection to the world”.

The Western European perception of the northern areas of the Ocean was often shaped by the imaginary travels described by Aethicus of Istria in the middle of the eighth century in his *Cosmographia*. Aethicus called the Northeast (*aquilo*) “the mother of dragons, breeding ground of scorpions, native land of snakes, and source of demons.”

But the Scandinavians perceived the Ocean of the Western Europeans, namely, the Atlantic and Arctic Oceans, as an almost enclosed sea that they navigated with remarkable successes. The Old Norse geographers described the land on the other side of that sea in the following way: “From *Bjarmaland* on, the lands not populated by the northern people extend to *Greenland*.” The transmarine lands are known only very sketchily and include *Bjarmaland* in the north of Eastern Europe, *Greenland*, *Markland*, and *Vinland*. The external Ocean on the other side of those lands radically differs from the Ocean of the Western Europeans and, rather, is comparable to the archaic Ocean of Homer. It represents the primeval chaos, where navigation is impossible, and from where one has never gained any reliable knowledge. A strait named by the Old Norse geographers “*Ginnungagap*” connects the external Ocean with the Atlantic west of *Greenland*. The same term described the original chaos in Scandinavian mythology.

One of the maps of the world in the ninth and 11<sup>th</sup> century manuscripts of the *Christian Topography* (ca. 550) by Cosmas Indicopleustes (#202) represents an interesting Eastern Christian parallel to the Scandinavian ideas about the limits of the known world. The map shows “the land on the other side of the Ocean where humans dwelt before the Flood.” That land extends in all directions and is located behind the Ocean. *Paradise* is depicted further to the East. As opposed to the Old Norse geographical texts, according to which the land on the other side of the Arctic Ocean connects with Eurasia in the area of *Bjarmaland*, there is no land bridge between the outside continent and the inhabited world.

Medieval scholars interpreted the results of the earliest geographical discoveries in the framework of those mythological and theoretical concepts. Vasilii, Archbishop of Novgorod, in his Epistle to Fedor of Tver about *Paradise* (1347), tells how the wind long carried Moislav and his son Iakov, sailors from Novgorod, around the sea until they discovered the high mountains with the holy *Paradise* atop. Most likely, he imagined those mountains to be located in the eastern parts of the Arctic Ocean. According to Archbishop Vasilii, hell is similarly found in the Arctic Ocean, though, in the west, where “there is the never sleeping worm, grinding of teeth, *Morg*, or the river of lightning [...] and water rushing in and out of the pit of hell thrice daily.” He cites his Novgorodian godchildren as eye witnesses to confirm his description.

When scholars from Western Europe received information about *Greenland* from Scandinavia, they attempted to conform it, when possible, to the Western European image of the world. In the 1070s, Adam of Bremen defined many northern areas, including *Greenland* as islands, encompassing the Scandinavian experience into the structure of eschatological geography of the Middle Ages. We should stress that *Greenland*’s definition as an island resulted from his purely theoretical reasoning. In the 15<sup>th</sup> century, the view of *Greenland* as a peninsula became predominant in Europe. Later, that view could be modified in accordance with the

theoretical conclusions about the northernmost limit of the world and the distribution of water and land. In principle, any Arctic land could be identified as Greenland.

The earliest cartographic depiction of Greenland belongs to Claudius Clavus, whose map of Northern Europe was included by Cardinal Guillaume Fillastre in his 1427 edition of Ptolemy's *Geographia*. Clavus was a Dane and so included some of the original Scandinavian knowledge on his map. Thus, Greenland on his map is attached to Northern Europe, and the long stretch of land connecting the two is subdivided into the areas of the Infidel Carelians, Maritime One-Leggeds (*Unipedes maritimi*), Maritime Pygmies (*Pigmei maritimi*), the Immense Region of Griffons (*Griffonum regio vastissima*), and the Land of the Wild Lapps (*Wildhlappelandi*).

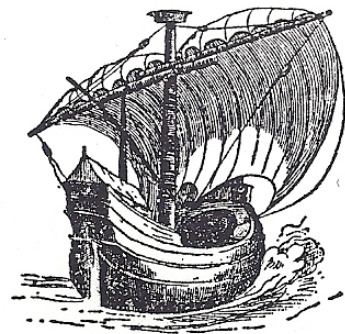
Western European successors of Clavus came up with two basic types of depictions of the peninsular Greenland attached to the Eurasian mainland, usually, in the north or northeast of Scandinavia. Greenland either stretches westward passing Iceland and bending to the south (Type A) or does not protrude farther west than the Scandinavian peninsula (Type B). Type B was presumably an invention of Donnus Nicolaus Germanus, a cartographer from Florence. His early maps (after 1466) adhered to type A, whereas starting in 1468, Nicolaus Germanus shows Greenland of the type B. The Type-B depiction emerged because of the desire to bring Clavus' map in line with the more traditional ideas about the North. However, Clavus' actual knowledge about Greenland as well as about Iceland and the Norwegian coastline was very limited. The works of Bjornbo, Petersen, Nansen, and other scholars have shown that the geographic names on Clavus' map reveal an unimpeded flight of fantasy, while the depiction of Greenland's coastline corresponds to the Norwegian coast in the Medici atlas of 1551. Clavus created his map in Italy where no one detected the mystifications in the Northern European and Greenlandic toponyms.

By the end of the 15<sup>th</sup> century, Western Europe and Muscovy had closer ties. New information about Russian discoveries in the Arctic region attracted interest in connection with both the search for a northeastern passage to China, and new concerns about Scandinavian colonies in Greenland. There were even reports about Russian conquest of Greenland in the already quoted letter that Hieronymus Münzer addressed to João II in 1493 as well as in Sören Norby's reports to the King of Denmark, Christian II in 1528. When we try to identify the historical and geographical reality behind such reports, we have to keep in mind that any land north of Norway and Russia could be considered Greenland, in accordance with the Scandinavian concepts introduced by Clavus to the Western European cartography.

The image of the "world ocean" on medieval maps reflects only some aspects of medieval oceanography. In conclusion, the 13<sup>th</sup> century English scholar Gervase of Tilbury (#224) provided evidence that the ocean that encircles the earth is connected to those waters that were separated at the creation of the world and are located above the celestial firmament (Genesis 1:7). His treatise written in 1209 – 1214 and intended for the instruction and entertainment of Emperor Otto IV included two stories that served as "experimental" evidence for the existence of the upper sea above the world in which we live. The first story has been traced to a Celtic folklore motive of an airship that appears high in the sky. The ship in Gervase's story lost her anchor that was subsequently used to make ironwork for a church door in Great Britain that "is still there for all to see".

The second story also becomes a proof of interconnectedness between the upper sea and the Ocean. *“There is a town in Gloucestershire called Bristol, a prosperous place, full of wealthy citizens. It is a port, from where one can cross from Great Britain to Ireland. A native of that place once went on a voyage, leaving his wife and children at home. After covering a great distance in the course of a long voyage, when the ship was sailing in a remote part of the ocean, the citizen in question sat down to eat with the sailors at about nine o’clock one morning. After the meal, he was washing his knife at the ship’s rail when it suddenly slipped from his hand. That very hour it fell through an open window in the roof of the citizen’s own home – the kind of window which the English call a skylight – and stuck fast in a table which stood beneath it, before the eyes of his wife. The woman stared at it in amazement, struck by the strangeness of this occurrence. She kept the knife, which she recognized from former days, and when, a long time afterwards, her husband returned, she learned from him that the day on which the accident occurred during his voyage coincided with the day on which she acquired the knife. Who then will doubt, given the manifest proof of this event, that there is a sea situated above the world we live in, in the air or above the air?”*

We can conclude from Gervase’s story that the ocean encircles not only the known and unknown lands but the whole cosmos as well. We see, that according to at least some of medieval cosmologies, the role of the ocean in the overall structure of the world is much more important than what can be understood from looking at medieval world maps. Many of these maps focused on the history of the humankind and its salvation, while the primary role of the world ocean in medieval cartography was to represent the frontier of all things human.



## 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 12<sup>th</sup> 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 in recent times.

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, (#215) a hole in the vellum (about 3 x 5 cm) had been patched and sewn with another small piece 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 *mappaemundi*. Three are outstanding for their detail: *Mappae clavicula* (late 12<sup>th</sup> century), *De arte illuminandi* (late 14<sup>th</sup> century), and the *Libro dell'arte* of Cennino Cennini (late 14<sup>th</sup> 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 12<sup>th</sup> century, and the Gothic or black letter in its various forms of the 12<sup>th</sup> to the 15<sup>th</sup> 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 13<sup>th</sup> 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.

Victoria Morse, in the *History of Cartography*, Volume IV, discusses the role of maps in later medieval society, the 12<sup>th</sup> to the 14<sup>th</sup> 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 14<sup>th</sup> 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 13<sup>th</sup> 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 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 13<sup>th</sup> 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. 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* (1987) 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 14<sup>th</sup> and 15<sup>th</sup> 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 *Mapping Time and Space* (1997) 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,” “Macrobius” 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 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 Opicino 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 12<sup>th</sup> and 13<sup>th</sup> century mapmaking within a much larger interest in understanding the physical world. This interest arose in many different areas of high medieval 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 12<sup>th</sup> 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.

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 12<sup>th</sup> 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 inhabited) zone 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 12<sup>th</sup> 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 13<sup>th</sup> 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 un-illustrated) 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 12<sup>th</sup> century Renaissances. This was due in part to the heightened attention given in the 12<sup>th</sup> 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 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 *mappaemundi* 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 "chrono-geography" 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. 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.

## Introduction

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 (#105). 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 10<sup>th</sup> 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 14<sup>th</sup> and 15<sup>th</sup> 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 14<sup>th</sup> 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 of 1459 (#249) (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 10<sup>th</sup> century (#210). The Henry of Mainz 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* (Book III, #253). Despite its publication date of 1475, this last work was derived from a much earlier source.

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, *Rome* and *Constantinople* among them.

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 (#207A 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, and plans of the Holy City as well.

Marvels and Legends: Representations of monstrous races and historical legends on *mappaemundi* reflected the medieval interest in the bizarre and fantastic. In classical times, especially in Greece, such a interest 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 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



## Introduction

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 15<sup>th</sup> 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.

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 was taken to include the "monsters". Hence, the main target of the medieval missionaries was 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 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 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 shown here is from the 13<sup>th</sup> century Psalter map*  
(#223)



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 added 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) shows, still within the reach of the left arm of Christ.

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.

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").

The *Prester John* legend, which Cortesão 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 12<sup>th</sup> 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 15<sup>th</sup> and 16<sup>th</sup> 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

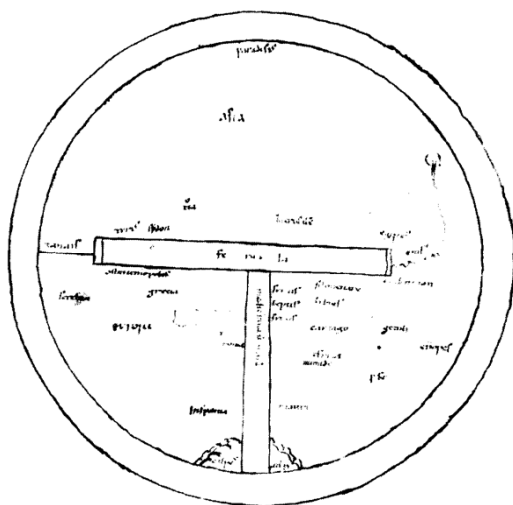


*Indies, and of the land of Prester John, if he could.*" According to Cortesão the story did not appear on any map until Carignano's chart of about 1307, where the king is found in Ethiopia, albeit rather indistinctly. In the Vesconte world maps of about 1320 (#228), Prester John is shown in India. On several maps thereafter until well into the 16<sup>th</sup> 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.

## 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 in the Passion, to the Last Judgment. Such an interpretation bears out von den Brincken's view that the maps are as much historical chronicles as geographical inventories.



*T-O Map with Tau Cross.*

*Such images reinforce the symbolization of the Passion of the Christ that is inherent within the T-O schema, the T-O representing the tau cross (crux commissa). Diameter of the original: 16.2cm. From an 11<sup>th</sup> century manuscript of Sallust, *De bello Jugurthino*.*

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.

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 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 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,

## Introduction

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: 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 of the medieval period 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 (#211, #213, #214). 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 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 12<sup>th</sup> century floor mosaic now in the Museo Civico, 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 relationships between the earth and the universe are well illustrated, for example, 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. 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.

Commonly, we find Jerusalem at the center of more ornate medieval T-O maps. According to Richard Firth-Godbehere the influence may have come from St. Jerome, who stated that ‘Jerusalem is situated in the middle of the Earth’, linking this to the suggestion that God performs his works ‘in the middle of the earth’ from *Psalms 73.1217* with *Ezekiel 5.5*: “Thus saith the Lord God; This is Jerusalem: I have set it in the midst of the nations and countries that are round about her” (*Ezekiel 5.5*). These words of the prophet Ezekiel overruled any trivial earthly needs for latitude or longitude. “Navel of the world” (*umbilicus terrae*) were the words of the Vulgate, the Latin version of the Bible. Medieval Christian geographers obstinately kept the Holy City right there.

There was nothing new about putting the most sacred place at the center. That is where the Hindus placed their Mt. Meru, “the center of the earth.” The belief in a sacred mountain, a hill of creation, with variants in Egypt, Babylonia, and elsewhere, was simply another way of saying that the most prominent place on earth had been the navel of the world. Eastern cities commonly placed themselves at the center. Babylon (*Bab-ilani*, “door of the gods”) was where the gods came down to earth. In Muslim tradition the *Ka'bah* was the highest point on earth, and the polestar showed that Mecca was opposite the center of the sky. The capital for a perfect Chinese sovereign was where the sundial cast no shadow at noon on the day of the summer solstice. It was not at all surprising that Christian geographers, too, put their Holy City at the center, making it the place of pilgrimage, and the destination of crusades.

The suggestion that this Biblical passage influenced all mapmakers may well be an oversimplification, however. Although most European maps from the 13<sup>th</sup> to the early 15<sup>th</sup> century exhibit this trait, there are maps from other periods that do not. Many simpler schematic maps, for example, do not mark Jerusalem at all, and some others do not seem to have a center of any kind. The dating of the shift of centrality in T-O maps to Jerusalem is unlikely to be coincidental; it was likely the direct result of the reaffirmation of Jerusalem as the center of the Christian world

through the Crusades. When we do find Jerusalem at the center, it can tell us something about the political make-up of the era.

Gerald Crone has suggested, European maps during this period existed as an inspiration for travel and pilgrimage to the Holy Land. Jerusalem had become an important political center. Crone believed that there had been a shift in the center of power from Rome, which was nearer the center of more ancient maps, to Palestine. Jerusalem had become a focal point that conveyed a cultural single-mindedness for the recapture of Jerusalem, and so it became the political focus of the governing authorities. Therefore, the enlarging of this area on maps was politically motivated. Christianity placed Jerusalem at its temporal and spiritual, rather than geographical, center. It is, after all, the city at the center of New Testament history; the focal point of Christian time. After the Crusades, Jerusalem had become the sacred, physical and temporal center of the Christian world. It was important spiritually and politically. The importance of pilgrimage, whether armed, spiritual or otherwise, is the message of this central location.

Despite such beliefs, Jerusalem was not always shown as the center of European medieval T-O *mappaemundi*. This is apparent in those maps not in the diagrammatic T-O category, such as Beatus, Orosius, or Higden, or important 12<sup>th</sup> century maps like that by Henry of Mainz. It is true that three particularly well known *mappaemundi*: the *Ebstorf*, *Hereford*, and *Psalter* maps, 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 (#220.1, which is not centered on Jerusalem) early in the 13<sup>th</sup> century, in contrast to the later *Hereford* and *Ebstorf* maps (both of which are so centered). By the 14<sup>th</sup> and 15<sup>th</sup> 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 purpose of European medieval maps was to remind the viewer of their place in the world, both physically and spiritually. During this time the purpose of maps was to remind the viewer of their obligations to Christendom, and of the political will of the church. Maps created during this time placed the viewer before all of creation – from the fall to the end of days – as a reminder of the sacrifice of Christ and the grace of God. The inclusion of *Paradise*, the *Last Judgement* and other Biblical events was a reminder of the power of God on Earth. This message could also be one of political control. In a world where Christian cosmology was the accepted reality, the presentation of the universe in a single gaze would remind the viewer of the need for obedience: obedience to God, His Church and those who God had placed in power. They were to remind people to ‘render therefore unto Caesar all the things which are Caesar’s, and unto God the things that are God’s. They were a visual representation of both a temporal and geographical cosmos for contemplation. They were ‘fossilized prayers’, intended to remind the viewer of the here-and-now, and more importantly, of the hereafter.

### Non-European Medieval Cartography

**ASIA:** The history of scientific geography and cartography is usually perceived and presented as containing an unaccountable gap between the time of Ptolemy (second century A.D.) and about 1400 A.D. Most older standard works on the subject seem restricted to certain conventions as to the participation of India, Japan and China: there are discussions of medieval European knowledge of Asia, what the Arabs said about it, and the stimulus of the visits made by the merchants and the religious-diplomatic envoys in the 13<sup>th</sup> century A.D., but rarely any in-depth discussion of indigenous Asian cartography itself (Needham 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 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 (78-139 A.D.) and one that was to continue, without interruption, down to the coming of the Europeans (i.e., the Jesuits) in the 17<sup>th</sup> century.

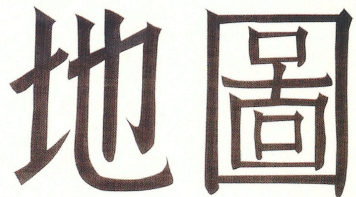
Despite the fact that virtually no Chinese maps have survived from the first millennium, it is nonetheless possible to reconstruct a rich context associated with their production, use and perception from a variety of written sources. The characteristics of the missing maps emerge through their associated texts, which have outlasted them. These examples include two documents that once accompanied maps presented to the emperor and an anecdote that refers to a map of the remote southern frontier. They demonstrate that the maps were designed not only to encapsulate imperial territory but also to serve as guideposts for aspirational travel. They were also perceived by their users as invitations to experiences both desirable and undesirable.

Beginning in early imperial China, maps presented to a sovereign were often accompanied by writing that anticipated the royal gaze and imparted an understanding of how the map was to be perceived by at least its primary user. Writing in a formal and persuasive genre known as

'*memorial to the throne*', the minister or official reported on administrative affairs and articulated his positions *vis-à-vis* imperial actions or deliberations, and early maps naturally figured in these addresses to the emperor.

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 Chinese maps, chiefly those in texts originally Indian (#263). During the T'ang Dynasty (618-907 A.D.) a fresh impetus was given to Chinese cartography by the expansion of the kingdom of China to *Tarbagatoy* in the north and the Indus in the south. A new description of these western lands, in a total of 60 volumes, was completed in 658 A.D.; 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 A.D. and later. This Asian "medieval" period culminated in the work of Chia Tan, a scholar who began in 793 A.D. 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 x 11 meters (32'9" x 36'), 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 Chinese maps from this medieval period were found in the *Forest of Tablets* at Hsiafu, the capital of Shensi province, in the far interior (#218). [The oldest known extent maps from China are the *Qin* maps, a.k.a. *the Fangmatan Maps*, dated 239 B.C. #111.] They are engraved on stone tablets in this "forest", which is a collection of the 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. (31.5" x 30") 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 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 image shows the Chinese characters '地圖' (dì tú) in a large, bold, black font. The characters are set against a light yellow rectangular background. The character '地' (dì) is on the left and '圖' (tú) is on the right.

*Chinese characters dì tú [Map of the Land].*

*The Chinese ideogram for "map" contains a schematic map*



## Introduction

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 11<sup>th</sup> 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 entitled the *Kuang Yü T'u* (#227); this later served the Jesuit Martino Martini as the basis for his famous *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.



The earliest printed map, surviving from China, depicting a portion of the western part of the country and showing part of the Great Wall, rivers, mountains, and settlements. It is assumed to have been made around A.D. 1155 so it predates the first printed European map by over three centuries. It is likely that earlier examples have not survived, since printing was invented in China in the eighth century A.D. and was used for scientific treatises in the following century. This early map which served as an illustration in an encyclopedia, is printed in black ink on paper (which had been invented in China in the second century A.D.), and it shows part of western China. In addition to settlements and rivers, a portion of the Great Wall is indicated at the north. This map has a north orientation that is, north is at the top of the map—which of course is now conventional in the West. The Chinese sometimes used orientations other than this, as did different peoples with whom they had contact. (For example, the Arabs, who settled on the coast of China before A.D. 750, characteristically made south-oriented maps.)

Japanese cartography developed quite independently. The earliest references to maps occur in an imperial decree, quoted in one of the chronicles (646 A.D.), 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 738 A.D. mentions quite definitely the publication of 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 15<sup>th</sup> 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 *Gyogi-type* mentioned above. Maps of this type continued to appear almost to the end of the 17<sup>th</sup> century, and they influenced Korean, Chinese and even European maps, as can be seen from the first map of Japan printed in Europe, which was made by Luís Teixeira and included in Ortelius' *Theatrum* in 1595.

India, *Sind-Hind* 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 documented 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 Seidi 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 scientific 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.

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”).

**ISLAMIC:** The classical geography of Ptolemy was lost to Europe and would remain so for many centuries. Yet the survival of his texts in eastern centers such as Alexandria, Antioch and Damascus meant that the first beneficiary of the Greek geographical system was Islam. By A.D. 750 Islamic power had spread from its Arabian heartland, west as far as Spain and east as far as India, and covered the larger part of the Ptolemaic world. Arab traders sailed to East Africa and to India and China, learning to master the monsoon winds that prevailed in the Indian Ocean. This remarkable maritime trade resulted in the Islamic penetration of Africa, and the development of caravan routes across the Sahara, up the White and Blue Nile into Sudan and Ethiopia, and via the East coast trading ports. The twin demands of Islamic religious practice, the pilgrimage to Mecca and the observance of the sacred direction of prayer - the *Qibla* - fostered a strong sense of precise geography in Islamic culture. When Islamic scholars sought to construct a systematic geography of the known world, the Greek model was their principal guide. Even more than the Romans, the Islamic dominion over large regions of Asia, Africa and Europe provided both a context for travel and the data for a world map. The former is exemplified in the exotic figure of Ibn Battutah, who in the 14<sup>th</sup> century travelled from his birthplace in Tangier throughout North Africa and the Middle East, to Central Asia beyond the Caspian Sea, to Mombasa and Zanzibar on the East African coast, and eastwards to India, Sumatra and China. He cannot be called an explorer, for he travelled existing caravan and sea routes, mainly with fellow Muslims, but for that very reason his travels hold up a mirror to the Islamic world of his day, and to the half-known, exotic lands that lay on its fringes, lands which become central in the fabulous tales of Sinbad.

An article by Sonja Brentjes, “Cartography in Islamic Societies”, summarizes the development of cartography in the Islamic world in a very succinct and understandable way. In Islamic societies, cartographic activities were part of courtly patronage and diplomatic exchange, educational literacy and scientific study, religious rituals and reminiscence, entertainment and the arts, and to some extent of war, seafaring, and administration.

Many of the extant Islamic cartographic products are parts of manuscripts. Words, narratives, numbers, tables, and geometrical figures organize, structure, delineate, and interpret them. Islamic books with maps form several topical categories as well as genres. They include cosmography, astronomy, history, and geography on the one hand and pilgrimage books, encyclopedias, dictionaries, and miscellanies on the other. The most important types of Islamic cartographic products are world maps, regional maps of the Islamic world, and maps and diagrams of the prayer directions, the *Qibla*.

The two earliest appropriations of cartographic products and practices from other cultures, which shaped mapmaking in Islamic societies for more than 500 years, occurred during the eighth and ninth centuries in Abbasid Baghdad and other regions of the empire. An important influence in the development of cartography was the patronage of the Abbasid caliph, al-

Ma'mun, who reigned from 813 to 833. He commissioned several geographers to re-measure the distance on earth that corresponds to one degree of celestial meridian. Thus his patronage resulted in the refinement of the definition of the mile used by Arabs (*mil* in Arabic) in comparison to the *stadion* used by Greeks. These efforts also enabled Muslims to calculate the circumference of the earth. Al-Mamun also commanded the production of a large map of the world, which has not survived, though it is known that its map projection type was based on Marinus of Tyre rather than Ptolemy. The first terrestrial globe of the Old World was also constructed in the Muslim world during the Middle Ages by Muslim astronomers and geographers working under Caliph al-Ma'mun in the 9th century. His most famous geographer was Muhammad ibn Musa al-Khwarizmi. He set the Prime Meridian of the Old World at the eastern shore of the Mediterranean, 10-13 degrees to the east of Alexandria (the prime meridian previously set by Ptolemy) and 70 degrees to the west of Baghdad. Most medieval Muslim geographers continued to use al-Khwarizmi's prime meridian. Other prime meridians used were set by Abu Muhammad al-Hasan al-Hamdanī and Habash al-Hasib al-Marwazi at Ujjain, a center of Indian astronomy, and by another anonymous writer at Basra.

One of the two cross-cultural encounters is represented through the translations of Claudius Ptolemy's *Geography* into Arabic during the ninth century and their subsequent appropriation and adaptation to the interests of scholars (#119). These translations were made in the circle of the Abbasid courtier and son of the Arab governor of Kufa, the philosopher (d. c. 260 h/874), and the Sabean moneylender, mathematician, astronomer, philosopher and theologian Thābit b. Qurra (d. 288 h/901). The other encounter had its basis in a series of maps of possibly Sasanian origin that were reproduced in Arabic, although it is unclear when this took place. These maps were adapted during the ninth and tenth centuries to the new political and religious powers and structures in Iran, the Arabian Peninsula, and Northern Africa. Step by step the original set of maps was enriched by maps of new regions of the Islamic world and accompanied by descriptions of the mapped territories and their cultures.

Two encounters led to different views on how to organize and represent the world and its parts. Maps in the tradition of Ptolemy's *Geography* worked with projections, latitudes and longitudes, grids, occasionally scales, and the theory of astronomically defined climates, mostly seven in number. They often contain short references to uninhabitable parts of the earth due to excessive cold or heat derived from Aristotelian physics and meteorology. The geographical space represented in such maps was first and foremost the entire world. It was mapped as a sphere or as a semisphere. Over time, such world maps focused more and more on the Islamic world. But certain regions of the world outside of Islamic societies continued to be reported about such as China, Sri Lanka, Byzantium, or the "Land of the Slaves". In addition to the world maps, maps of oceans, seas, rivers, and islands are extant from this cartographic encounter. These local maps show clear non-Ptolemaic features. They may be the result of the mapmakers' efforts to translate textual and oral geographic information into images. The people involved in this cartographic tradition were primarily scholars of the mathematical sciences which comprised in Islamic societies in continuation of earlier Greek models number theory, geometry, theory of proportions, and astronomy. The most important representatives of this tradition in Islamic



societies were the lost maps produced in the early ninth century for the Abbasid caliph al-Ma'mūn (r. 198–218 h/813–33), the maps extant in Muhammad b. Mūsā al-Khwārazmī's (fl. late second-early third century h/late eighth-early ninth century) *Sūrat al-'ard* [image/form of the earth], the maps extant in copies of the new Arabic translation of Ptolemy's *Geography* made by Georgios Amirutzes (d. 1475) and his son for the Ottoman Sultan Mehmet Fatih (r. 849 h/1444 and 855–86 h/1451–81), and the maps found in the geographical chapter of texts on *'ilm al-hay'a* [mathematical cosmography] such as Nizām al-Dīn al-Nīṣābūrī's (d. 730 h/ 1329) *Tawdīh* or *Sharh. al-Tadhkira* [explanation of or commentary on the 'Memoir'].

Maps derived from possible Sasanian models worked with geometrical figures such as circles, semicircles, crescents, triangles, rectangles, ovals, and straight lines to represent regional units, directions, and distances. Their focal points are the postal and pilgrimage routes within the Abbasid Empire and other Islamic states, for instance, in al-Andalus [Muslim Iberia] and the main parts that formed the Abbasid caliphate. The views on what these parts were and which rank each part assumed in relationship to the others depended largely on the outlook the mapmaker and commentator subscribed to a preference for Iranian cultural values, a preference for Islamic values, or a preference for his own environment and travel experiences. The set of maps created within this tradition included, as a rule, a world map and, in most cases, 21 regional maps. Most of the world maps in the extant manuscripts show the world as a full circle; but there are also manuscripts from as early as the tenth century and as late as probably the 17<sup>th</sup> or 18<sup>th</sup> century that show the world as a bird. The distribution of the regions over the body of the bird varies. China or Arabia can be found as the head. India, the land of the Khazars in the Northern Caucasus Mountains, Asia, or Africa fill the wings. The tail is taken up by Northern Africa or Europe.

The world maps show cosmological concepts such as *al-Bahr al-Muhīt* [the Encompassing Sea] also known from much earlier cultures and religious concepts specific to the *Qur'ān* and other sources of Muslim belief such as the *barzakh*, a small, narrow land barrier that separates the two main oceans of the maps, that is, the Indian Ocean and the Mediterranean Sea. The main *Quranic* meaning of *barzakh* is, however, not geographical, but eschatological. It denotes the life of the soul after the death of the body until the "Day of Judgment". The provinces and regions in these world maps are mostly registered in form of rectangular tables or stripes of boxes. They also include countries outside the Islamic world such as India or China. A few cities such as Mecca or Alexandria, rivers and occasionally their sources, islands and tribes are also noted.

The regional maps focus entirely on the Islamic world. They map Iran, Central Asia, parts of the Caucasus Mountains, the Arabian Peninsula, Iraq, the Fertile Crescent, Northern Africa, and three seas (the Persian Sea that is the Indian Ocean; the Mediterranean Sea and the Caspian Sea). The sequence of the mapped regions and their relative delineation differs from my naming them in the sense that most extant manuscript maps show the following order and content: Arabia; Persian Sea; *al-Maghrib* [Northwest Africa]; Egypt; Syria; Mediterranean Sea; *al-Jazīra* [Northern Iraq and Southeast Turkey]; Iraq (Central and South Iraq); Khuzistan; Fars; *Kirman* [parts of Iran]; *Sīnd* [part of Pakistan]; Armenia, Arran, Azerbaijan (part of Caucasus Mountains, Azerbaijan, and Iran); Jibal; Daylam, Rayy, Tabaristan (parts of Iran), Caspian Sea;

Persian Desert; Sijistan; Khurasan (parts of present-day Iran, Turkmenistan, Pakistan, Afghanistan); and Māwarā'al-nahr (part of Uzbekistan).

The people creating maps and writing texts in this cartographic tradition were mostly members of the Abbasid administration for which they worked as officers of the postal routes or of the finances, philosophers, and scholars of religious disciplines, or wealthy, independent travelers and merchants. After its first famous practitioner, the geographer, mathematician, astronomer, physician, philosopher, and student of al-Kindī, Abū Zayd Ahmad b. Sahl al-Balkhī (d. 322 h/934, #214.2), this tradition is called the *Balkhī School* of geography. Other major representatives of this school were Abū Ishāq Ibrahim b. Muhammad al-Istakhri (fourth century h/tenth century #211), Abū l-Qāsim Muhammad b. Hawqal (d. c. 367 h/977, #213), and Abū 'Abdallāh Muhammad b. Ahmad al-Muqaddasī (d. c. 390/1000). The earliest maps surviving from this body of works belong to a manuscript of Ibn Hawqal from 479 h/1086 extant in the Topkapı Sarayı Müzesi Kütüphanesi in Istanbul.

There exist hundreds-if not thousands-of cartographic images of the world and various regions, scattered throughout collections of medieval and early modern Arabic, Persian, and Turkish manuscripts. The sheer number of these extant maps tells us that-at least from the 13<sup>th</sup> century onward, whence copies of these map-manuscripts begin to proliferate-that the world was a much-depicted place. It loomed large in the medieval Muslim imagination. It was pondered, discussed, and copied with minor and major variations again and again, with what seems to be a peculiar idiosyncrasy to modern eyes. The cartographers did not strive for mimesis, i.e., representation or imitation of the real world. They did not show irregular coastlines, for example, even though some of the geographers within whose work these maps are encased openly acknowledge that the landmasses and their coastlines are uneven. They present instead a deliberately schematic layout of the world and the regions that comprised the Islamic empire.

These images employ a language of stylized forms that can make them hard to recognize as maps. For this reason, these maps are mostly unexamined and have often been deliberately ignored on the grounds that they are not "mimetically" accurate representations of the world. These schematic, geometric, and often symmetrical images of the world are iconographic representations -"carto-ideographs"- of how medieval Muslim cartographic artists and their patrons perceived their world and chose to represent and disseminate this perception.

On the surface it seems that these often elaborately illuminated a-mimetic cartographic works, employing pigments made from precious metals and stones, must have been produced for the elite literati of medieval Islamic society, such as the commissioners/patrons, collectors, copyists, and high-status readers of the geographic texts within which these maps are found. This conclusion ignores the easy-to-replicate nature of these schematic images, which would have enabled students visiting the libraries of sultans, amirs, and other members of the ruling elite to transport basic versions of these carto-ideographs back to the people of their villages and far-flung areas of the Islamic world.



Most of these maps occur in the context of geographical treatises devoted to an explication of the world in general and the lands of the Muslim world, in particular. These geographical atlases which should be acknowledged globally as the first of their kind-generally carry the title of *Kitab al-masalik wa al-mamalik*, although they are sometimes named *Surat al-ard* [Picture of the Earth] or *Suwar al-aqalim* [Pictures of the Climes/Climates]. These manuscripts emanate from an early tradition of creating lists of pilgrim and post stages that were compiled for administrative purposes. They read like armchair travelogues of the Muslim world with one author copying prolifically from another.

Beginning with a brief description of the world and theories about it - such as the inhabited versus the uninhabited parts, the reasons that people are darker in the south than in the north, and so on-these geographies methodically discuss details about the Muslim world, its cities, people, roads, topography, and so forth. Sometimes the descriptions are interspersed with tales of personal adventures, discussions with local inhabitants, debates with sailors as to the

exact shape of the earth and the number of seas, and so on. They have a rigid format that seldom varies, with a territorial sequence as follows: first the whole world, then the Arabian peninsula, the Persian Gulf, the *Maghrib* [North Africa and Andalusia], Egypt, Syria, the Mediterranean, upper and lower Iraq, and concluding with twelve maps devoted to the Iranian provinces, beginning with Khuzestan and ending in Khorasan, including maps of *Sind* and *Transoxiana*. The maps, which usually number twenty-one-one world map and twenty regional maps-follow the same format as the text.

Not all of these geographical manuscripts contain maps, however. Only those referred to generally as part of the *al-Balkhī/al-Istakhri* tradition, also referred to as the *Classical School* of geographers, include maps. For this reason the cartographically illustrated manuscripts of this genre are also referred to as the *Atlas of Islam*. A great deal of mystery surrounds the origins and the architects of this manuscript-bound cartographic tradition. This is primarily because not a single manuscript survives in the hand of the original authors. In fact, the earliest extant manuscript of the tradition dates from the late 11<sup>th</sup> century, almost a century after the death of the last reported author. As a result, it is not clear who initiated the tradition of accompanying geographical texts with maps.

The most pervasive feature of maps in Arabic, Persian, and Ottoman Turkish after the centuries of translation, adoption, and adaptation is, however, their combination of more than one cultural tradition of cartography. World maps attached to geographical, cosmographical, or historical texts combine between the 11<sup>th</sup> and the 16<sup>th</sup> century elements of the Ptolemaic tradition with the components of the *Balkhī School* to which their makers added further elements taken from the *Qurʾān* and contemporary developments in politics, commerce, war, or demography. *Mount Qāf*, another *Qurʾānic* concept, appears for instance as a mountainous ring enclosing the *Encompassing Sea* in maps joined to geographical manuscripts such as Abū ʿAbdallāh Muhammad b. al-Sharīf al-Idrīsī's (495– c. 560 h/1100– c. 1165, #219) *Nuzhat al-mushtāq fī khtirāq al-aḥfāq* [*The Pleasant Journey of Those Who Desire to Travel through Faraway Lands*], to texts seen as popularizing scientific ideas such as Zakariyāʾ al-Qazwīnī's (d. 682 h/1283, #222) *Kitaḥ ʿajāʾib al-makhlūqāt fī gharaʾib al-mawjū dāt* [*Book of Marvels of Things Created and Miraculous Aspects of Things Existing*], and to texts of a more religious character such as the *Kharīdat al-ʿajāʾib wa-farīdat al-gharaʾib* [*The Unbored Pearl of Wonders and Precious Gem of Marvels*] attributed to Sīrāj al-Dīn Abū Hafs ʿUmar b. al-Wardī (d. 861 h/1457, #214.1). The maps to *The Book of Curiosities*, a 12<sup>th</sup> century manuscript on astronomy, geography, commerce, and wondrous things copying a work of the 11<sup>th</sup> century, include already the famous circular map ascribed to al-Idrīsī ( #219). It also has a rectangular world map and maps of the Indian Ocean, the Mediterranean Sea, Cyprus, Sicily, maps of great rivers such as the Nile, the Euphrates, and the Tigris, maps of the former Fatimid capital al-Mahdiyya and the Egyptian town of Tinnīs, and maps of lakes. The author, in all likelihood a Fatimid custom officer, combined conceptual and technical elements of the Ptolemaic tradition such as climate zones, geographical coordinates, a scale, and the configuration of the Old World with symbolic features from al-Khwārazmī's maps such as the depiction of the *Mountains of the Moon* as sources of the Nile and conceptual and representational elements of the *Balkhī School* such as the representation of rivers by straight



lines or lakes by circles to which he added information from travelers, texts, and perhaps administrative documents. He chose some unique and not yet well-understood forms of representation for the Mediterranean Sea and the Indian Ocean (an oval) and for Cyprus (a rectangle divided into smaller units of rectangles and text).

Al-Shaʿīf al-Idrīsī (#219) and his geographical and cartographic work represent another kind of cross-cultural encounter since he lived in more than one of the Mediterranean cultures. He was born in Ceuta, received his education in al-Andalus, and traveled widely in the Islamic world. Then he worked for two Norman kings, Roger II (r. 1097–1154) and William I (r. 1154–66) at their court in Palermo. At the end of his life, he returned to the Islamic world, possibly to Ceuta. Conceptually, he followed Ptolemaic cartographic theory and methods. He produced two sets of new maps. One was a circular world map engraved on a silver plate, which is lost. The other is a set of 70 regional maps drawn on paper. They are extant in various manuscripts across the world. Al-Idrīsī planned to combine them into one large rectangular map of the known world stretching from 180 degrees in the east in the *Sīlā Island* [Korea] to the prime meridian in the west running through the *Fortunate Isles*. Presenting Roger not only as a successful conqueror and master of politics, he described him as the head of the cartographic project who decided on what geographical and cartographic truth was. One method applied for sorting out conflicting information was to trace with iron instruments on a drawing board all data on longitudes, latitudes, and distances. Al-Idrīsī wrote two, perhaps even three geographical texts, all of them lavishly illustrated with regional maps portraying the entire world in a combination of Ptolemaic concepts with ideas and symbols taken from the *Balkhī School*. He also had access to non-Arabic oral and perhaps written sources and provided fresh information about the physical and cultural geography of European lands, not available previously in Arabic.

Contrary to the impression that one receives from traditional histories of cartography, the richest heritage of pre-Renaissance maps has come down through history from the medieval Islamic world rather than ancient Greece or medieval Europe. Muslim carto-geographical scholars from the 10<sup>th</sup> century CE onward drew on Greek, Babylonian, Coptic, Syriac, Sassanian, Indian, Chinese, and Turkic knowledge to produce a new genre of detailed maps of the known world. According to Islamic historian Karen Pinto there exist an estimated 2,000+ cartographic images of the world and various regions, scattered throughout collections of medieval and early modern Arabic, Persian, and Turkish manuscripts. The sheer number of these extant maps tells us that, at least from the 13<sup>th</sup> century onward, whence copies of these map-manuscripts begin to proliferate, that the world was an often a graphically depicted place. It loomed large in the medieval Muslim imagination. It was pondered, discussed, and copied with minor and major variations again and again, with what seems to be a peculiar idiosyncrasy to modern eyes. The cartographers did not strive for *mimesis* (i.e., the representation or imitation of the real world). They did not usually show irregular coastlines, for example, even though some of the geographers within whose work these maps are encased openly acknowledge that the landmasses and their coastlines are uneven. They presented instead a deliberately schematic layout of the world and the regions that comprised the Islamic empire.



Until recently these maps lay virtually untouched, often deliberately ignored on the grounds that they are not mimetically accurate representations of the world. This perspective overlooks the great value of these images as representations of the way medieval Muslims perceived their world. The most thorough and recent research on early Islamic cartography can be found in the 2016 book *Medieval Islamic Maps* by Karen Pinto. These schematic, geometric, and often symmetrical images of the world are iconographic representations—“carto-ideographs”—of how medieval Muslim cartographic artists and their patrons perceived their world and chose to represent and disseminate this perception. The abundance of extant copies produced in locales across the Islamic world for eight centuries testifies to the enduring importance of these maps. Because all images are socially constructed, these iconic carte-ideographs contain valuable information about the milieus in which they were produced. They are a rich source of historical data that can be used as alternate gateways into the past.

On the surface it seems that these often elaborately illuminated a-mimetic cartographic works, employing pigments made from precious metals and stones, must have been produced for the elite literati of medieval Islamic society, such as the commissioners/patrons, collectors, copyists, and high-status readers of the geographic texts within which these maps are found. This conclusion ignores the easy-to-replicate nature of these schematic images, which would have enabled students visiting the libraries of sultans, amirs, and other members of the ruling elite to transport basic versions of these carto-ideographs back to the people of their villages and far-flung areas of the Islamic world.

As mentioned above, the majority of the medieval Islamic maps occur in the context of geographical treatises devoted to an explication of the world in general and the lands of the Muslim world in particular and should be analyzed and studied within the context of the associated text. Not all of these geographical manuscripts contain maps, however. Only those referred to generally as part of the al-Balkhi/al-Istakhri (#214.2 and #211) tradition, also referred to as the *Classical School* of geographers, include maps. For this reason the cartographically illustrated manuscripts of this genre are also referred to as the “Atlas of Islam.” These first of a kind of geographical atlases generally carry the title *Kitab al-masalik wa al-mamalik* [Book of routes and provinces] a.k.a. KMMS, although they are sometimes named *Surat al-ard* [Picture of the earth] or *Suwar al-aqalim* [Pictures of the climes (or climates)]. They emerge out of an early tradition of creating lists of pilgrim and post stages that were compiled for administrative purposes. Beginning with a brief description of the world and theories about it - such as the inhabited versus the uninhabited parts, the reasons why people are darker in the south than in the north, and so on - these geographies methodically discuss details about the Muslim world and its cities, people, roads, topography, and the like. Sometimes the descriptions are interspersed with tales of personal adventures, discussions with local inhabitants, and debates with sailors as to the exact shape of the earth and the number of seas. They have a rigid format that seldom varies, with a territorial sequence as follows: first the whole world; then the Arabian Peninsula, the Persian Gulf, the *Maghrib* [North Africa and Andalusia], Egypt, Syria, the Mediterranean, and upper and lower Iraq; and concluding with twelve maps devoted to the Iranian provinces, beginning with Khuzistan and ending in Khurasan, including maps of *Sindh* and *Transoxiana*. The

maps, which usually number twenty-one, one world map and twenty regional maps, follow the same format as the text.

A great deal of mystery surrounds the origins and the architects of this manuscript-bound cartographic tradition. This is primarily because not a single manuscript survives in the hand of the original authors. Furthermore, it is not clear who initiated the tradition of accompanying geographical texts with maps. Scholars of the 18<sup>th</sup> and 19<sup>th</sup> centuries held that Abu Zayd Ahmad ibn Sahl al-Balkhi [hereafter al-Balkhi] (d. 322 / 934, #214.2), who—as his *nisba* (patronym) suggests—came from Balkh in Central Asia, initiated the series and that his work and maps were later elaborated upon by Abu Ishaq ibn Muhammad al-Farisi al-Istakhri (fl. early 10<sup>th</sup> century #211) from Istakhr in the province of Fars. Al-Istakhri's work was, in turn, elaborated upon by Abu al-Qasim Muhammad ibn Hawqal (fl. second half of 10<sup>th</sup> century, #213), who came from upper Iraq (the region known as the Jazīra). Finally Abu 'Abdallah Muhammad al-Muqaddasi (d. ca. 1000) from Jerusalem (Quds) is considered the last innovator in the series. The problem is that other than al-Balkhi virtually no biographical information exists on the other authors. We are forced to rely on scraps of information scattered here and there in the geographical texts themselves for information about the authors. Furthermore, in all the forty-three titles that Ibn al-Nadim credits to al-Balkhi not one even vaguely resembles the title of a geographical treatise. According to the biographers, al-Balkhi was most famous as a philosopher and for his *tafasir* (*Commentaries on the Qur'an*), which were highly praised. He is not, however, known in the biographical record for his geographical treatises. Yet stories of how al-Balkhi sired the Islamic mapping tradition abound and endure. It is for this reason that the genre is generally referred to as the "Balkhi school of mapping." Karen Pinto finds this attribution of a whole school of mapping to a shadowy, mythical father unfounded and stubbornly refuses to continue the misnomer and have opted instead for a new acronym: the KMMS mapping tradition. Pinto bases this acronym on the title of the genre's most widely disseminated version: al-Istakhri's, *Kitab al-Masalik wa al-Mamalik* (KMM). The 'S' added on to the end of the acronym stands for *Surat* [picture], i.e. those KMM geographical manuscripts that are accompanied by cartographics.

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.

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. Mohammed'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 Mohammed 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 Mohammed's esteem for the works of Ptolemy, later presented him with his 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.

During the Middle Ages the Greek tradition of disinterested research was stifled in Western Europe by a theological dictatorship which bade fair, for a time, to destroy all hope of a genuine intellectual revival. Further, socio-economically and politically the Latin West had gradually drifted apart from the Greek and Muslim East, thereby widening the already present cultural cleavage. Meanwhile the Muslims were slowly unearthing the treasures of Greek and Persian wisdom, and in so doing they became fired with enthusiasm to study them. Aided by their own native genius, by the keenest inter-regional competition - for Muslim culture radiated from a number of centers distributed all the way from Samarkand to Seville - and the stimulus of the classical models, they succeeded in advancing the cause of every known science before being overtaken by a tyrannical obscurantism. For example, the Muslims of the Eastern Caliphate had become familiar with Claudius Ptolemy's *Almagest* and *Geographia* (#119) through Syriac translations and through versions of the original Greek text. A manuscript of the *Kitab al-Majisti*, or *Almagest* (meaning 'the greatest'), was translated into Arabic in the days of Harun ar-Rashid by that caliph's vizier, Yahya, and other translations appeared during the middle part of the ninth century. Study of the *Almagest* stimulated Arab scholars and incited them to write such original treatises of their own as Al-Farghani's *On the Elements of Astronomy*, Al-Battani's *On the Movements of the Stars*, or *Astronomy*, and Ibn Yunus' *Hakimi Tables*. Furthermore, Ptolemy's *Geographia* was certainly known to the Muslims in Syriac translations and probably also in copies of the original Greek text. With the *Geographia* as a model, a number of Arabic treatises, usually entitled *Kitab surat al-ard*, [Book of the Description of the Earth], were composed at an early period of Islam and served as bases on which later geographical writers built more complex systems. One of the most significant was the *Kitab surat al-ard* of Al-Khwarizmi, composed about the time of Al-Ma'mun (813-833 A.D.). From another book of the same sort and title Al-

Battani derived the geographical details included in his *Astronomy*. The latter was translated into Latin during the 12<sup>th</sup> century; the former was known in Europe only through second-hand sources.

Most Arab cartographers also used Ptolemy's instructions in the construction of their own maps. With this basis the Muslims combined the accumulated knowledge gained through exploration and travel. Muslim trade between the seventh and ninth centuries reached China by sea and by land; southward it tapped the more distant coasts of Africa, including Zanzibar; northward it penetrated Russia; and westward Mohammedan navigators saw the unknown and dreaded waters of the Atlantic. Their own enlarged knowledge of the explored-world helped to broaden their cartographic outlook, and contemporaries soon acknowledged the preeminence of their civilization. Arab astronomers continued the observations that had been discontinued in Greece; they measured an arc of the meridian by observations made in Baghdad and Damascus; they constructed improved astronomical instruments and set up observatories. As a general rule, however, the Arabs were very stylized cartographers; they were apt to use the compass and ruler far too often so that land contours became stereotyped and rather arbitrary, as can be seen in maps by al-Istakhri, al-Kashgari, and Ibn Said (#211, #214 and #221).

Over the years, these enlightened Arabs injected new life and a storehouse of knowledge into the relatively backward science of Western Europe, and, for centuries, Arab culture actually dominated the Iberian Peninsula and Sicily. However, in the 11<sup>th</sup> century the Norman conquerors were beginning their advance westward and southward, overrunning the littoral of Western Europe, reaching the Mediterranean and establishing themselves in Southern Italy between 1066 and 1071. These new rulers preserved much of what was best of this Arabic tradition and culture, and Muslim scholars played a brilliant part in the intellectual life of the court.

The confusion is further compounded by the fact that many of the surviving copies contain either incomplete colophons or no colophons at all. Additionally, the texts are sometimes so mixed up in the surviving manuscripts that it is often difficult to disentangle them. The numerous incomplete and anonymous manuscripts, often abridged, along with the versions translated into Persian, further cloud the matter. Since the extant examples stretch in time from the 11<sup>th</sup> century to the 19<sup>th</sup> century and range from the heart of the Middle East to its peripheries, they can provide us with a broad range of historical insights across time and space.

The earliest extant *KMMS* manuscript is by Ibn Hawqal (#213) and is housed at the Topkapı Saray Museum Library (*Ahmet 3346*). This mapping tradition dates back to the 10<sup>th</sup> century, although the earliest extant manuscript containing maps is from the 11<sup>th</sup> century. For more detail on this manuscript tradition see Karen Pinto, 'Cartography', in *Encyclopaedia of Islam and the Muslim World*, Richard C. Martin, Said Amir Arjomand, Marcia Hermansen, Abdulkader Tayob, Rochelle Davis and John Obert Voll (eds.) (New York: Macmillan Reference, 2003), 128–31 and *Passion and conflict, Medieval Islamic views of the West* by Karen C. Pinto). It is firmly dated to 479/1086 by its colophon. The striking mimesis of the maps in this manuscript stands in stark contrast to the later *KMMS* map copies, which over the centuries abandon any pretense of mimesis entirely. Moving through the *KMMS* set, we travel through a series of more and more stylized maps that shift further into the realm of *objects d'art* and away from direct empirical

inquiry. By the 19<sup>th</sup> century the *KMMS* maps become so stylized that, were it not for the earlier examples, it would be hard to recognize them as maps of the world.

Other variations of this *KMMS* tradition include world maps found in copies of Zakariya' ibn Muhammad al-Qazwini d. 1283 CE (#222), whose work *'Aja'ib al-makhlūqat wa ghara'ib al-mawjūdāt* [The Wonders of Creatures and the Marvels of Creation] focuses on the wonders of the world—real and imaginary. Although al-Qazwini's original manuscript is not illustrated, copies from the late 13<sup>th</sup> century onward—during the lifetime of the author—incorporate illustrations of flora and fauna, as well as world maps based on what can be referred to as the *al-Biruni model*. The large number of extant *'Aja'ib* manuscripts indicate that, at least from the 13<sup>th</sup> and 14<sup>th</sup> centuries onward, the world maps had a significant audience. The al-Biruni variation looks at the world from above and shows the old world spread-eagled on a circle surrounded by the *Encircling Ocean* (a combination of the Atlantic and Pacific Oceans). It is found in copies of *Kitāb al-taḥfīm li-awa'il sina'at al-tanjīm* [Book of Instruction on the Principles of the Art of Astrology] from the mid-13<sup>th</sup> century onward. Eventually, world maps based on the al-Biruni model appear in general geographical encyclopedias, such as Yaqut's 13<sup>th</sup> century *Kitāb mu'jam al-buldan* [Compendium of Lands].

From the late 12<sup>th</sup> century onward, other types of maps abound, such as *hajj* [pilgrimage] certificates and travelogues containing map-like pictures of the holy sites. These can be read as an indication of the growing demand for visual images of sacred spaces. Eventually, the scope of these pilgrimage scrolls expands to become an illustrated *hajj* manuscript series called *Futuh al-haramayn* [The Conquests of the Holy Sites], which first appears in the early 16<sup>th</sup> century and proliferates thereafter. Like the copies of Ibn al-Wardi's *Kharīdat al-'Aja'ib*, the number of pocket-book sized copies of this manuscript are too numerous to count. In tandem with these *hajj* manuals, a tradition begins of including in mosques a glazed tile containing a schematic map-like representation of the Ka'bah with directional markings similar to *qiblah* maps adjacent to the *mihrab* [prayer niche].

From the 13<sup>th</sup> century onward, world maps appear in historical treatises. Some manuscripts of the famous Islamic historian al-Tabari's *Tarikh* [History] include a "clime-type" map of the world as part of the frontispiece. Copies of another well-known historian's work, Ibn Khaldun's (1332–1406) *Muqaddimah* [Prologue], also opens with an al-Idrisi-type world map. An unusual variant of a *KMMS-type* world map even surfaces in a 16<sup>th</sup> century Ottoman history scroll containing Seyyid Luqman's *Zubdat al-tawāriḥ* [Cream of Histories] produced during the reign of Süleyman I (r. 1520–1566).

The spread of Islam in the centuries following the ascension of the Prophet Muhammad provided a unification and stability that allowed Arab and Persian scholars to travel uninhibited throughout much of the known world. Geographical knowledge developed through first-hand observation in regions inaccessible to the Greeks and Romans and led to the emergence of a host of prodigious Islamic geographers whose works rivaled those of Ptolemy, Strabo and Pliny. Arab and Persian traders made extensive sea journeys to India, the East Indies, China and Africa, returning with tales both popular and scientific. Ahmad al-Ya'qubī traveled for twenty years between India and North Africa and in 891 completed the *Kitāb al-Buldan* that described all the



countries and major cities of the Islamic world. About the same time, Ibn Khurdadhbīh delineated the trade routes as far as the Indies, with references to China, Korea and Japan. In 922 Ahmad ibn Fadhlān crossed the Caspian Sea, ascended the Volga, and witnessed a Viking ship burial. Al-Muqaddasī, who wrote around 985, traveled the entire world and produced the first maps in natural colors, similar to those we have today. Around 977 Muhammad ibn Hawqal, who spent thirty years in remote regions, took the caravan route to Darfur and Lake Chad, sailed on the Niger and penetrated as far as the kingdom of Ghana.

Geographical studies in this early period reached their height in the complementary works of Abu'l-Hasan al-Mas'ūdī and Abu Rayhān al-Bīrūnī. Mas'ūdī, who has been likened to a Muslim Herodotus, went everywhere between the Caucasus and East Africa, the Mediterranean and India. An intellectual giant of his time, the first to fully appreciate the interplay between geography and history, his monumental *Akhbar az-Zaman* stretched to thirty volumes and encompassed kingdoms well beyond the Islamic world. In 990 Bīrūnī, who has been called the father of both geodesy and anthropology, calculated the latitude of his home town at the age of seventeen. He subsequently traveled widely in India, studying the religion and customs of its people. He produced 146 books in every field of natural science and calculated the radius of the earth to within 17 kilometers [10 miles] of its accepted value. In regarding heliocentricity and geocentricity as equally acceptable, philosophical rather than astronomical, Bīrūnī also anticipated the basis of Einstein's relativistic theories. His work would remain unmatched in Christendom for another six centuries,

By far the most popular tradition from the late 15<sup>th</sup> century onward was a unique pocket-book encyclopedia tradition by Ibn al-Wardī, d. 1457 (#214.1) called *Kharīdat al-'Aja'ib wa farīdat al-ghara'ib* [The Unbored Pearl of Wonders and the Precious Gem of Marvels], which typically includes one world map per copy (of either the *KMMS* or al-Bīrūnī variety), along with other cartographic images, such as a *Qiblah* map (way-finding diagrams and instruments for locating Mecca) and an inset map of Qazwīn and other cities.

Unfortunately, this rich indigenous mapping tradition has been overlooked thanks to the modern predilection to evaluate maps according to their representational accuracy. Thus the best-known examples of Islamic maps are those that are the most mimetic. Famous for precisely this reason is the work of the 12<sup>th</sup> century North African cartographer, Sharīf al-Dīn al-Idrīsī, d. 1165 (#219), whom the Norman king Roger II (1097–1154) commissioned to produce an illustrated geography of the world: *Nuzhat al-mushtaq fi ikhtirāq al-afaq* [The Book of Pleasant Journeys into Faraway Lands]. The maps that accompany the copies of al-Idrīsī's manuscript have been heralded time and again for their mimetic accuracy and are rightly acclaimed as well ahead of their time. Not only are the al-Idrīsī maps ranked among the most mimetic world maps of the later Middle Ages, they also include detailed regional maps that show an astounding depth of understanding of the topography of the greater Mediterranean region.

One of the lingering issues with al-Idrīsī's work is that there are no extant examples of his work from his time period of the 12<sup>th</sup> century. Nor are there any original autograph manuscripts. The earliest extant al-Idrīsī manuscripts are from the 14<sup>th</sup> century. The other issue with al-Idrīsī's work is that it is unique and therefore not representative of the bulk of the medieval Islamic

mapping tradition. Comprising seventy sectional maps, this work was accompanied by full textual descriptions of the countries, cities and peoples of each region. Al-Idrisi's world map bears a strong resemblance to that of Claudius Ptolemy (#119); the most significant differences were that the Islamic scholar did not believe that the Indian Ocean was land-locked, and he clearly had definite knowledge of China's eastern coast. However he perpetuates a typical error of Islamic maps - the enormous eastward extension of Africa's east coast, and this was derived directly from Ptolemy. This is a puzzling feature, for Arab seafarers trading to Mombasa, Zanzibar and south as far as Sofala (near the mouth of the Zambesi) could surely have contradicted it. The effect is that the Indian Ocean is shown as an elongated sea with many large islands, resembling the Mediterranean. The huge peninsula of India escaped the mapmaker, as it had escaped Ptolemy. These errors are useful reminders of two things: first, whatever the scientific achievements of Islamic scientists in the fields of mathematics and astronomy, mapmaking and compass charting were technical and empirical skills that lay still in the future; and second, that the scholars who made the maps were not the same men who sailed to Malindi, Mombasa, Calicut or Ceylon. According to Ms Pinto, Al-Idrisi's work cannot be held up as representative of the Islamic mapping tradition, nor can the maps that are attributed to him be used as a source of insight into the worldviews of medieval Muslim cartographers and their milieus. At best, al-Idrisi's work can be used to illumine the worldview of the milieu surrounding Roger II in Norman Sicily, possibly with some insight into the North African—specifically Tunisian—ambit. But even here we have issues, since the four extant manuscripts are productions of a century or so later. We cannot, therefore, ascribe with surety the worldview expressed in these copies as being representative of the Norman-Muslim world of the 12<sup>th</sup> century. As outstanding as al-Idrisi's work is for inserting mimesis into late medieval Islamic mapping repertoire, it needs to be addressed with these cautions in mind.

Similarly, the 16<sup>th</sup> century Ottoman naval admiral Piri Reis, c. 1470–1554 (#322) is famous for the earliest extant map of the New World. Piri Reis and his surprisingly accurate early 16<sup>th</sup> century map of South America (1523) has been the subject of many a controversial study. In keeping with the emphasis placed on Western products in the field of the history of cartography—especially maps from the Renaissance onward—scholarship on Piri Reis's map has focused on its connections with early modern European cartography.

The same could be said of the acquisition of the *Book of Curiosities* manuscript by Oxford, which has received considerable attention in the opening decade of the 21<sup>st</sup> century. This manuscript contains a medley of hybrid maps, some unique and others that reflect the influence of the *KMMS* tradition. The square world map is unusual and merits further in-depth analysis. The Bodleian's *Book of Curiosities* is, like the maps of the al-Idrisi manuscripts, plagued by dating issues. Although the text of the manuscript has been dated to the 10<sup>th</sup> century by Evelyn Edson and Emilie Savage-Smith, the maps reflect a late 12<sup>th</sup> - or early 13<sup>th</sup> century Islamic miniature style. While unique manuscripts such as the *Book of Curiosities* are intriguing additions to our repertoire of the Islamic cartographic tradition, we must bear in mind that they are not representative of the popular mapping tradition that was widespread in the medieval Islamic world.

Since all images are socially constructed, these iconic carto-ideographs contain valuable information about the milieus in which they were produced. They are a rich source of historical data that can be used as alternate gateways into the past. Karen Pinto writing in *The Oxford Encyclopedia of Philosophy, Science, and Technology in Islam* edited by Ibrahim Kalin, in *Maps and Mapmaking* - addressed the Islamic contribution to medieval cartography. Her 2016 book entitled *Medieval Islamic Maps: An Exploration* is the latest and most comprehensive analysis of the subject.

The process by which the Arabs' *Batlamīyus Kludiya* retrieved Claudius Ptolemy's writings resulted in providing his knowledge to a completely alien linguistic and cultural universe. In early ninth-century Baghdad, a conscious effort was made under the Caliph al-Ma'mun to produce Arabic versions of Greek scientific and philosophical works. The toleration that Islam extended to peoples with a shared scriptural tradition - "*The Peoples of the Book*" - meant that Muslim scholars who did not know Greek were able to benefit from direct contact with Christian scholars who did. Nestorian Christians who had maintained the traditions of the Alexandrian academy were attracted to the brilliant court in Baghdad. Here they were safe from Byzantine persecution, and were able to meet Muslim and Jewish scholars avid for Greek learning. Some Arab scholars were able to master Greek and work directly with the original texts, or translate them into Arabic. Other scholars worked through the intermediary of translations from Greek into Syriac, prepared by Nestorian Christians.

There is hardly a work of Greek science or philosophy that was not available in Arabic by the mid-ninth century. Al-Hajjaj finished his translation of Ptolemy's *Almagest* in 826; the *Geography* may have been translated even earlier. These two books established the framework within which astronomical and geographical researches were to be conducted for the next 700 years.

Ptolemy was not received passively in the Islamic world. From the very beginning, the *Almagest* and the *Geography* were subjected to very critical scrutiny. The observatories set up by al-Ma'mun were used to correct Ptolemy's star catalogue; the *Geography* was recast, coordinates re-calculated and hundreds of new observations added. His mathematics were sometimes violently criticized, amended and refined as new instruments were invented and more sophisticated mathematical tools became available. As more early Arabic texts are edited and published, the originality of the work of Muslim scientists and mathematicians becomes increasingly apparent.

The Arabic versions of Greek texts prepared in ninth-century Baghdad circulated throughout the Islamic world. The translations were revised, commentaries were written upon them, and original works were composed that used the naturalized texts as points of departure. This growing body of scientific literature, for the most part produced in little more than 100 years, found its way to western Islamic lands very early. Córdoba became a leading intellectual center in *al-Andalus*, or Muslim Spain, in the 10<sup>th</sup> and 11<sup>th</sup> centuries. When Toledo fell to the Christians in 1085, another effort was made to transfer the legacy of the ancient Greeks to another language, this time to Latin. In the early 12<sup>th</sup> century, Muslim, Christian and Jewish scholars produced a corpus of translations, from the Arabic, of the Greek authors and their Arabic commentators.

The first printed Islamic maps appeared in the early 18<sup>th</sup> century in Istanbul, first as single-sheet maps, but quickly followed as parts of a book on the Old and the New World, that is, *H.ajjī Khalfī's* (d. 1067 h/1657) *Cihān-nu'mā* (version II). These printed maps adopted and adapted certain cartographic conventions, methods, and fields of interest that dominated cartography in early modern Catholic and Protestant societies in Europe. This was, however, neither the first nor the last encounter between the various cartographic traditions and practices as pursued in various societies around the Mediterranean basin. The length and depth of the history of these cross-cultural encounters renders the notion of a history of cartography in well-defined geographical and cultural spaces that formed separate entities difficult to sustain.

Mapmaking in Islamic societies took its themes, methods, techniques, and formats from several societies that either existed before the emergence of Islamic societies or parallel to them. The regions where these societies flourished were Greece, Egypt, Iran, India, China, Spain, Italy, the Netherlands, and France. With the shifts and changes in Europe since the 16<sup>th</sup> century, further European societies became relevant to cartographic activities in various Islamic societies, among them Russia, German countries, and Great Britain.

It is clear that the level of interest shown by Arab-Muslim geographers in the populations that make up Europe varies depending on the nature of the project. In those centered on the domain of Islam, Europe is given peripheral attention, while in universalist or encyclopedic projects, the European component constitutes a whole section part. In the 10<sup>th</sup> century, an ethnic vision predominates. Viewed from Baghdad or Cairo, Europe at the turn of the first millennium was a mosaic of peoples. Ibrāhīm ibn Ya'qub, who travelled through the region, describes people busily going about their various work or religious activities.

The above description evolved, undoubtedly because the point of view changed, into a collection of towns connected through trade relations: One town produces, another sells, and such-and-such a traffic passes through yet another. As movement around Europe improved, the information collected and organized in Sicily constructed a more detailed image of this urbanized territory, but the boundaries of its developing States were still vague for our observers. Western sovereigns were rendered less exotic by the Crusades for readers however.

Finally, while Rashid ed-Dīn showed us with his global project that it was perfectly possible to assemble 'geopolitical' data about the whole of Western Europe from Iran, the perspective from Cairo was different. Al-'Umārī and subsequently al-Maqrīzī a century later reduced the focus on 'useful' European States in favor of the Mamelukes, in other words the States and merchant cities of Southern Europe. The old frameworks were not necessarily rejected however because al-Maqrīzī integrates them into an exposition on genealogy.

What does not change however is the vagueness and the absence of any sustainable concept for defining Europe save for the cartographic approach. 14<sup>th</sup> century Europe as viewed from Cairo or Damascus was a Europe of urbanized monarchies and merchant cities, throughout which two variants of Christianity had spread. While the reasons for the Great Western Schism are not perceived, the distinction between a Byzantine and a 'Roman' (Latin) domain is recorded and fully affirmed in the 13<sup>th</sup> Century. Islam spread on the eastern fringes of Europe. Between the 10<sup>th</sup> and 13<sup>th</sup> Centuries, we see a clarification among our writers of the notion of the Pope and of

temporal power in the West while, at the same time in their works, the forms of power implemented in Mediterranean (monarchies, municipalities) become more complex. In short, the populations of Europe, their ways of life and their political organizational structures certainly did not leave Eastern geographers cold.

Fuat Sezgin, in the article “Fuat Sezgin and the Re-writing of the History of Geography: by Detlev Quintern, has shown in his deep studies on the history of mathematical geography and cartography in Islam and its continuation in the West that during the reign of Abbāsid caliph al-Ma'mūn (813- 833 AC) the disciplines had been further developed decisively. The al- Ma'mūn era went hand in hand with an early enlightenment. While introducing a new world view – not least into the history of cartography – European mapmakers started from the mid of the 13<sup>th</sup> century onwards to adapt the Arabic rational cartography. Map-making in Venice in the first quarter of the 14<sup>th</sup> century was motivated by imperial expansion. The world map of Marino Sanuto (1260-1331) is an outstanding example of early imperial geography and cartography. Geographical and cartographical knowledge of so far unknown regions and oceans, especially the Indian Ocean, was a pre-condition for expansionist proto-imperialism of European powers in the footsteps of the so-called crusades. In contrast to the travel reports of the Venetian traveler Marco Polo (1254-1324) – still playing an important role in Eurocentric geographies, cartographies and in so-called history of discoveries – the “Secret Book of the Holy Crusade” (*liber secretorum delium crucis*) spoke plainly on the desire to conquer Egypt and Palestine. As history of science and techniques in general, not least history of geography, cartography and so-called discoveries are in urgent need to be discussed critically. Quintern's article, based on the path-breaking findings of Fuat Sezgin from his comprehensive oeuvre *Geschichte des Arabischen Schrifttums* [History of Arabic Writings] in 17 volumes, contributes to the de-colonization of early European map-making.

## Conclusions

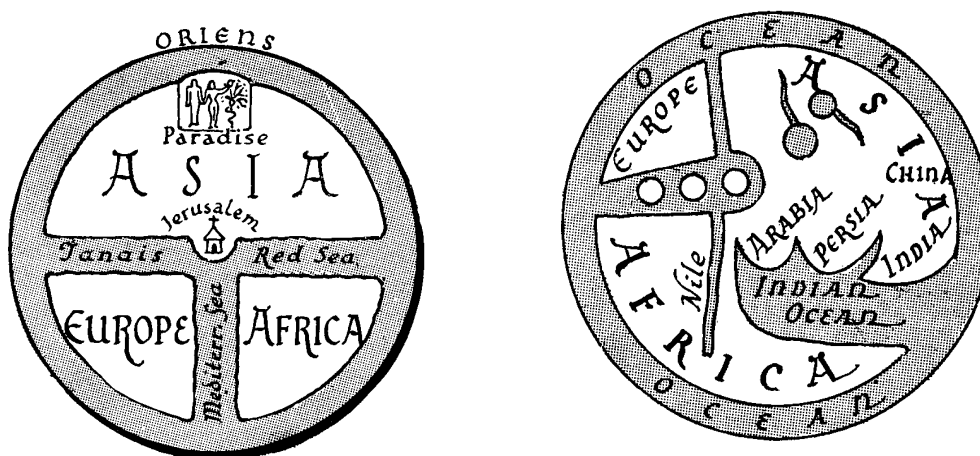
Traditional histories of European medieval cartography contain a number of misconceptions concerning the *mappaemundi*. The three most important of these are: (1) the assumption that geographical accuracy was the prime function of the *mappaemundi* (and hence that their goal was poorly achieved); (2) 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 G.R. 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 20<sup>th</sup> century historiographic ingenuity can counteract the overwhelming evidence that the function of most European *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 on the 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.

As observed by Richard Unger, the maps became, in the hands of medieval artists, syncretic pictorial chronicles parallel to textual ones. The artists put history into a geographical framework, and did so with text and with pictures. Telling the story of the past in both time and space was done through text on the map itself with explanations and captions often spread around them in the learned language of Latin. Some maps did show signs of an interest in travel but the travel was always for religious purposes. Maps were not designed to show pilgrims exactly which roads to follow but rather to give them some idea of relative location and of the religious function of pilgrimage. It was the Significance of places as much or more than their location that interested cartographers. As compilations of knowledge, as transmitters of the learning of the classical past, as chronicles of Christian history, as sources of meditation and inspiration, *mappaemundi* were highly valued. They may not have been necessary to Christian devotion but they did offer a significant supplement. That is why prominent figures in and outside the church continued to commission their production and artists continued to make them through the 14<sup>th</sup> century.



The T-O, or T-in-O [Orbis Terrarum] on the left; on the right an outline of the cartogram style used by the Arabic school of maps (re-oriented here with North at the top, note that the Islamic maps were normally oriented with the South at the top).

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 *mappaemundi* was by no means a universal convention throughout the Middle Ages but was largely confined to the post-Crusade period in the 13<sup>th</sup> and 14<sup>th</sup> 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.

Though the goal of European *mappaemundi* was to promote religious contemplation, the influence of classical geographical knowledge remained strong and was ) only slowly if at all supplanted. The center of T-O maps was always in the eastern Mediterranean but it was not until the 13<sup>th</sup> century that cartographers began to identify the centre of the map with Jerusalem as the center of the world. While the site of the Resurrection rarely took the most prominent place on *mappaemundi* it did in the very large *Ebstorf* (#224) and *Hereford* (#226) and in other well known maps. That has led to overemphasis of the idea of the importance of the city in the minds of western Europeans and been taken as more evidence that people in the Middle Ages knew nothing about geography. The world map dedicated to the Empress Mathilda by the cathedral canon Henry of Mainz from around 1110, for example, is centered on the area surrounding the sacred, at least for pagans, island of Delos (see #215). The over 300 zonal maps based on Macrobius (#201) are centered on the equator, so on many maps the focal point was not even in the eastern Mediterranean. The first map to put Jerusalem in the geometric center was not produced until the 12<sup>th</sup> century. The error of thinking that people in the Middle Ages believed that Jerusalem was the center of the world and that medieval maps were the expression of that belief, despite abundant evidence to the contrary, has not prevented the repetition of that misconception.

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's 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 15<sup>th</sup> stated this categorically. Furthermore, by the 14<sup>th</sup> 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 15<sup>th</sup> century *Vienna-Klosterneuburg* map corpus. Obvious priorities would include regional studies on *mappaemundi* associated with the geographical culture in 13<sup>th</sup> 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 needs 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 15<sup>th</sup> 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 16<sup>th</sup> and 17<sup>th</sup> 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 15<sup>th</sup> 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 15<sup>th</sup> 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.

The maps of this period provide the most convincing possible illustrations of the geographical ideas that were current. Their bright colors, naïve legends, childlike but often skillfully drawn vignettes, and preposterous inaccuracy take us back into the atmosphere of a credulous and uncritical age. We can catch much more of the flavor of the popular geography of the Middle Ages by a hasty glance at one of the fascinating *Beatus* representations of the world than by plowing through many of the dry pages of compilations like the *De imagine mundi*.

The copying of manuscripts in the Middle Ages was considered a valued and necessary service for the transmission of knowledge. The reproduction of existing texts was an act of devotion as well as one of preservation. Most texts were intended for school use and so it was in educational institutions and notably in monasteries that most copying was done. Books were the normal products of copyists and along with those books in some cases came maps. Copying invariably meant some variation in detail from one version to the next since extremely rare was the copyist who precisely reproduced the original. In some cases scribes were left not with maps but with imprecise or inadequate text descriptions of maps and so had to recreate or create the

maps. That yielded significant variation, the text often being hard to interpret. It was not only the difficulty of copying maps which made for inconsistencies, even within the same tradition, but also the choices open to the copyist or artist. While the sources might be the same for mapmakers and the Biblical precedent may have been uniform, what to include and what to leave out was still up to the cartographer. The reliance on precedent, the lack of geographical awareness among most copyists, desires to maintain quality and to execute maps in a timely fashion and to transmit the correct information created a reliance on past practice and over the long term created a series of similar maps that fell within broad cartographic traditions. Those traditions might not be straitjackets for mapmakers but they did decide what types of illustration were warranted.

One obvious case of a model yielding many imitations and variations came from Sallust's *Bellum Jugurthinum* written around 45 BCE. The book included a discussion of the geography of Africa and with that some thoughts on the divisions of the world. The text or some classical efforts to illustrate the text yielded a model map, signs of which turn up especially in the early Middle Ages. Perhaps the most extreme example of a single tripartite map which led to extensive imitation came from the work of Isidore of Seville (see #205). He made a lasting impression on western Christian thought through the eleventh century and beyond and on cartography as well since two of the 20 books of his major work, *Etymologies*, were devoted to geography.

The critical issue for all of them, and especially for Isidore of Seville, was what pagan knowledge was acceptable and how Christians should exploit that useful knowledge. Isidore's work, transmitted through among others the English monk Bede (673-735), influenced much of the Latin Christian writing of the early Middle Ages and shaped map making. The depiction of the world had a different purpose, different from what existed in the Roman Empire and different from that in the Renaissance and beyond. The form maps took was part of the answer to the question of the role of classical knowledge and indeed of all learning for Christians.

The simpler tripartite and quadripartite maps that illustrated works like those of Isidore or Sallust fell into a recognizable pattern already at the beginning of the Middle Ages. The same was true with other world maps where certain traditions emerged and then were elaborated and changed in the high Middle Ages. Beatus (c. 711-500, see #207), a Benedictine monk from Saint Martin, now Santo Toribio, at Liebana in northern Spain, wrote a commentary on the Apocalypse in the late eighth century. Included were some 75 illustrations, supplemented with even more in some of the total of 34 surviving manuscripts of the text from the 10<sup>th</sup> to the 13<sup>th</sup> centuries. Included was a world map that took on different shapes in variants in the many reproductions. The map included four continents and though the map maker may have been influenced by Arabic learning, that is not a likely explanation for the presence of the land mass in a southern hemisphere. Connections to maps in works of Isidore of Seville are possible. So is some inspiration from the work of the sixth century anonymous Alexandrian author of a *Christian Topography*, called Cosmas Indicopleustes and best known for his claims that the world was flat (see #202). The Beatus map included offshore islands of Europe but only the largest. The oceans surrounding the continents and those islands were not left empty as was common among other early medieval maps. The mapmaker decorated the seas with fish, something that often

recurred in later versions and possibly offered artists the option of incorporating items on and in the waters.

**Inaccuracy:** What strikes us first is their extraordinary inaccuracy. It is easy to laugh at this because subconsciously, but inevitably, we compare the outlines of seas, continents, and regions as represented in these maps with the outlines with which we have become familiar in modern atlases. We tend to forget that the contours of Europe, Asia, and Africa as we now know them are not images that have been stamped upon the minds of men at all times, that their accurate representation is the result of a series of long and laborious observations completed only at a relatively recent date. Hence it is somewhat unjust to reproach the medieval cartographer with his inaccuracy, for the reason that accuracy in the present-day sense was something impossible for him to achieve. The Greeks and Moslems, to be sure, had made far better maps than did the European men of the Middle Ages; but, unfortunately, Greek maps had perished, few Arabic maps came through to the West, and the prevalent ignorance of Greek made it impossible for the Occidental scholar to gain inspiration from treatises on cartography written in that tongue.

Furthermore, it is a mistake to regard accuracy as the goal and ideal of the medieval mapmaker. To gain a sympathetic understanding of his work we must see what purposes he intended it to fulfill. He drew maps to accompany and clarify the written texts to which they were usually subsidiary. The maps were more or less in the nature of diagrammatic sketches on which the features of the earth's surface were shown in a general way, and the draftsman understood perfectly well that all he could hope to give was a rough approximation to relative positions. The medieval scribe and mapmaker was an artist who took pride in the beauty of his work. The same motives which impelled him to enliven his manuscript with a multitude of miniatures led him to relieve the coldly geometrical outlines of his map by lines and colors pleasing to the eye, by entertaining sketches and readable legends. He was creating something very different from the modern cartographic or topographic sheet that stands on its own merits as an independently useful, scientific document and from which we can get precise information about distances, heights, positions, and terrain. He would have branded any man a fool who thought that one could hope to determine from his map the distance from Jerusalem to England or from the mouth of the Ganges to the mouth of the Nile. In other words, most medieval maps—including wall maps—were nothing more than rough diagrams converted into works of art.

When, during the latter years of the 13<sup>th</sup> century, the sailors of the Mediterranean, driven by the necessity of securing reliable aids to navigation, began piece by piece to construct marine charts upon which the contours of the coasts were shown with an approach to modern correctness, we have indeed a revolution in cartographic art and geographical science.

Bearing in mind these considerations, we see that the major inaccuracies of medieval maps are (1) exaggeration in the scale of particular regions at the expense of others; and (2) distortion, often amounting to a complete failure to show places in their proper relative positions. The first of these inaccuracies was usually deliberate, the second more or less unavoidable. Both are well-known characteristics of our modern American railway folder maps.



**Exaggeration:** The purpose of exaggeration was, of course, to emphasize the most interesting and significant localities. For example, on many maps of the world, Palestine, about which a good deal was known and in which interest naturally was centered, is shown to be almost as large as all the rest of Asia put together. The *Jerome* map of the East exaggerates Asia Minor to an enormous size, making it a greater distance from Constantinople to Mount Ararat than from Armenia to *Taprobane* [Ceylon/Sri Lanka]. On the other hand, the *Jerome* map of Palestine itself would lead us to believe that the district lying between the Lebanon, the Jordan, and the sea is at least three times as large as the Anatolian peninsula. Certainly nobody ever thought that such proportions actually obtain in nature. Similarly, the plans of cities that are not infrequently included in maps are often immensely enlarged in relation to surrounding country, as, for example, in the case of London, Rome, Acre, and Jerusalem on Matthew Paris' pictorial *Itinerary* and map of Palestine (#225.4), and Jerusalem on the *Situs Ierusalem*.

**Distortion:** Errors arising from distortion were due partly to ignorance and partly to the necessity of making the map fit either the page upon which it was drawn or else a preconceived idea of an oval, or circular world. The *Cotton*, or *Anglo-Saxon*, map (#210), several of the *Beatus* series (#207), and even Matthew Paris' maps of Britain (the best of the whole period, #225), show a semi-rectangular land mass corresponding to the pages of the codices. On the latter a legend frankly admits that, if only the size of the page permitted, the island would be shown longer than it is. The manner in which geography was forced to conform to a circular or oval world is admirably illustrated in the treatment of the islands of the ocean. On the *Beatus* series and on Lambert's *mappamundi* (#207 and #217) Britain and the other islands appear as small, round, oval, or rectangular blocks more or less regularly spaced in the circumambient ocean. Other maps, like that of Henry of Mainz/Sawley (#215), fit the islands into recesses in the oceanic shores of the continental areas so that the smooth outlines of the whole landmass are preserved.

An extreme of confusion and disregard for reality is found in one of the *Beatus* group preserved in Paris. Here it is difficult to make out which continent is which. India, for instance, lies just across the Red Sea from Spain (it is doubtful in what direction); Arabia would seem to be in the farthest Orient, adjoined by Greece on one side and Thrace on the other. Such absurdities are unusual, but even the best maps of the period show serious errors when measured by modern standards. On the *Cotton* map (#210), for instance, in such a well-known part of the world as Italy, locates Ravenna on the Mediterranean shore southeast of Rome and shows an amazing eastward displacement of Arabia and the Red Sea, though in many other respects its geography, relatively speaking, is very good.

**Technique:** The diagrammatic character of these maps is evident in the technique of their workmanship. They all show a tendency toward geometrical lines, curves, and symmetry. This is carried further on some than on others (as, for example, in the more primitive specimens of the *Beatus* group); but, in nearly all, the ocean is represented as a smooth circular band of even width; and, in many, rivers and mountains follow direct lines or regular curves. It is obvious that the ruler and compass were not neglected.

**Conventions:** Moreover, certain cartographic conventions were followed. In the great majority of cases east was placed at the top, and some authorities have endeavored to trace this convention back to the maps of the Romans. While this explanation of its origin may be true, the traditions of the Church, which placed in the Orient the *Garden of Eden* together with the mountain of the waters of the world and of human life, must have had much to do toward perpetuating it. Conventions of a sort were also observed in the use of colors on colored maps: seas and rivers were nearly always blue or green, except for the Red Sea, which was invariably red. Less uniform was the color used for mountains: on the map of the world of Henry of Mainz/Sawley and on one of Lambert's *mappaemundi* they are red; the *Cotton* map shows them a brilliant green; and one of the maps of Matthew Paris, a yellow.

**Symbols and Legends:** Symbols representing the various features of the earth's surface were more or less conventionalized, though we can hardly say that any definitely developed "conventional signs" were in use. It is the usual intention of symbols as employed on modern maps to reproduce the appearance of the various features more or less as they look when viewed from above. This is relatively recent development; on medieval maps such elements as mountains, forests, and cities were shown as they appear from the side. In addition to symbols, legends were extensively employed to explain details of the map's surface, and sometimes these were expanded to considerable length to include historical data and other points of interest. A large variety of subjects were represented on these maps by symbols, vignettes and legends.

The atmosphere figures in the *Turin Beatus* (#20.15) in pictures at the four corners of wind blowers seated astride of windbags. On the *Jerome* map of the East (#215) the names of certain of the winds are written along the eastern border, and wind blowers were familiar figures in the cartography of a later period than ours.

The ocean and inland seas, usually tinted green or blue, are generally without symbols to emphasize their watery nature, except perhaps for pictures of fish. On two of the *Beatus* series, however, lines are drawn running parallel to the coasts, showing that the medieval draftsman had hit upon and crudely executed a modern scheme of representing water. The *Guido* map of Italy represents the sea by scalloped lines. On the *Guido* map of the world (#216) the size of the Mediterranean and its branches is enormously enlarged; whereas the worst examples of the *Beatus* group show the inland seas as narrow channels bounded by straight shores.

The width of rivers is nearly always immensely exaggerated; on some maps rivers appear to be as wide as the seas themselves. Only the *Cotton* (#210) map forms an exception in representing them (except for the Nile) as single lines. On the whole, hydrography is drawn arbitrarily. Streams cross each other, separate, and connect one sea with another; though the *Jerome* maps, certain of the *Beatus* series, and the *Cotton* map place the headwaters of many of the rivers of Asia and Europe in mountain ranges. Lakes are generally represented as bulb-shaped bodies from which rivers rise or into which they expand.

No attempt was made to show by symbols different kinds of land surface, except perhaps by Matthew Paris in one of his maps of Britain (#225.2), which differentiates the marshy country

## Introduction

of the eastern shires from the rest of the island. On certain members of the *Beatus* group we read legends in Africa and Asia calling the country *deserta et arenosa*; and legends appearing on Matthew Paris' maps describe the boggy, wild, and mountainous country of northern Scotland and Wales. The *Paris II Beatus* has a legend in a remote part of Asia indicating "land uninhabitable on account of the abundance of water."

Mountain ranges were generally represented by jagged, sawtooth lines running parallel to straight lines; particularly high or famous peaks, by a single great pyramid. Such pyramids are prominent features in the *Beatus* series, where woods are often shown growing upon them. The *Hyrceanian Forest* is depicted and labeled on the *Jerome* map of Palestine, and the pepper forests of India are indicated on the *Jerome* map of the East.

Among the cultural works cities and buildings take a foremost place, represented by vignettes of castles, towers, and churches. On several maps especially notable works are depicted, as the *Lighthouse of Alexandria*, the *Tower of Babel*, the *Columns of Alexander and Hercules*; and the seas are sometimes filled with ships. As to men themselves, the legends give the names of cities, provinces, and countries. The *Jerome* maps give a series of tribal names in *Scythia*. Adam and Eve with the serpent were stereotyped features enlivening the East on many but by no means all the maps of this period; and on the *Osmia Beatus* (#207.14) we see the features of the twelve apostles distributed over the earth's surface.

The monsters of India were also represented by vignettes of a *skiapod*, or shadow-foot, on two of the *Beatus* group, where this uncomfortable creature is shown as the most prominent inhabitant of the austral continent and the existence of other monsters is hinted at by legends referring to *griffons*, *cynocephali*, and the like. Some maps that display a plethora of 'monsters' include the *Psalter* mappamundi (#223), the *Ebstorf* mappamundi (#224), the *Hereford* mappamundi (#226), and the *Borgia* mappamundi (#237).

In surveying the extant maps of this period as a whole, and in comparing them with one another, it is impossible to detect any appreciable "development" from worse cartography to better by modern standards. To be sure, Matthew Paris' three maps of Britain are often considered the best (#225.2). But they represent a limited area; and among the maps of the world the *Cotton* map (#210), which possibly dates from the 12<sup>th</sup> century but may be very much older, holds by all odds the highest rank so far as cartographic excellence goes. The complex and elaborate wall map of the late 13<sup>th</sup> century in Hereford Cathedral and the immense *Ebstorf* map at Hanover (dated 1234) represent the culmination of a process in the direction of increasing elaboration that had been in progress throughout the age. They do not indicate any improvement in cartographic standards but rather, as was the case with some of the great works of compilation of the time, a multiplication of fabulous and incongruous detail. They are the cartographic counterparts of the *Image du monde* and the *Livre du tresor* of Brunetto Latino.

This *Introduction* has attempted to shed some light on the background and significance of early medieval cartography. It was meant to place the following monographs into perspective, and, since few illustrations were used, to also point out the necessity of good quality illustrations to any discussion of maps.

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 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.

The classification of medieval maps has been a subject of discussion among historians of cartography since the second half of the 19<sup>th</sup> century. Efforts to catalogue the more than 1,100 maps that have survived created the necessity of establishing categories if only to handle the variety and quantity. Some level of agreement about groupings has emerged in recent years thanks to more careful examination of those diverse images. No universally accepted solution is yet in hand. The categories that have come up are generally based on both the intellectual roots of the maps and the classical examples that formed the basis for their designs. The total number of surviving maps is much greater for the later centuries than the earlier ones of the Middle Ages, creating questions about levels of production and of how representative the sample may be. For example, only some eleven maps exist from the eighth century but about 250 are known from the 13<sup>th</sup>. The close relationship, the similarities in appearance and in conception, between tripartite and quadripartite maps make it possible to discuss them together. Transitional maps only appeared in the 14<sup>th</sup> and 15<sup>th</sup> centuries and represented a marked deviation from previous practice.

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 13<sup>th</sup> 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.

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 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 12<sup>th</sup> and 13<sup>th</sup> 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 (#201), 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 14<sup>th</sup> and 15<sup>th</sup> centuries as world maps began to incorporate material from the *portolan* charts and from the newly discovered maps of Ptolemy’s *Geography*.

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, purpose 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



## *Introduction*

sensitivity to the categories available within medieval culture as well as those that modern interpreters find helpful to impose on their medieval sources.

