Theatruin Orbis Terrarum

Science and literature in the Middle Ages and at the period of the Renaissance

P. L., Jacob

1877

•

Geographical Science.

Latin and Greek Geographers. Measurement of the Roman World. Voyages of Hippalus and Diogenes. Marinus of Tyre, Pomponius, Mela, and Ptolemy. Coloured and Figuratve Itineraries. Barbarian Invasions. Stephen of Byzantium. Geographical Ignorance from the Sixth to the Tenth Century. Charlemagne and Albertus Magnus. Dicuil. Geography amongst the Arabs. Master Peter and Roger Bacon. Vincent of Beauvais. Asiatic Travellers in the Thirteenth Century. Portuguese Navigation. The Planisphere of Fra Mauro. First Editions of Ptolemy. Maritime Expeditions in the Fifteenth Century. Christopher Columbus and Amerigo Vespucci. Spanish, Dutch, and French Travellers, Sec., in the Sixteenth Century.

GREAT as was the progress of geographical knowledge after the establishment of the Roman empire, still greater, in contrast, were its decadence and disfavour in the early part of the Middle Ages ; that is to say, in the beginning of the fifth century. Geography, in fact, was one of the most useful auxiliaries of the aggressive policy of Rome, directing the march of her expeditions all over the world, and enabling her to acquire useful knowledge concerning the countries which she had conquered. It may, therefore, be said that the science of geography was in general practice during the reign of Augustus. A perusal of the principal writers of that period is sufficient to show how widely spread were the general notions of geography in a society which, being well versed in letters and highly educated, was acquainted with the great works of the ancient Greek geographers, especially those of Eratosthenes (276 194 u.e.) and Polybius (204 121 B.C.), and which used Sn;il>u's Greek Geography as a manual for reading the Latin historians and poets, and as a guide-book for the most distant provinces of the empire. Poets such as Virgil, Ovid, Manilius, and Lucan, and historians such as Livy and Julius Csesar, were also geographers ; and Pliny the Elder summed up, in his four books of " Natural History," all the results obtained by geographical research, and set forth in a number of works no longer extant.

Pliny often mentioned in his " Natural History" the geodesical operation attributed to Marcus Vipsanius Agrippa, prime minister and son-in-law of Augustus. It was Julius Caosar who, during his consulship (according to the positive assertion of Ethicus, a geographer of the fourth century), " ordered by a senatiis-comultum that the whole Roman world should be measured by men of the greatest ability and endowed with all sorts of knowledge." This vast enterprise, intrusted to four Greek mathematicians and geographers, Zenodoxus, Theodotus, Polyclitus, and Didymus, who had under their orders a staff of geodesical measurers and land surveyors, was completed in twenty-five years. It would appear that Agrippa took the matter in hand, and when it was completed he proposed to construct at Rome a gigantic portico, beneath which he intended to " unfold the map of the world before the eyes of the universe," as Pliny expressed it. The premature death of this illustrious general prevented the execution of this grand project, but the map of the Roman world, with the roads and distances indicated, was deposited in the archives of the Senate (Fig. 192).

Nor was the progress of geography assisted by the victorious armies alone, for the travellers, and still more the merchants, whose vessels, even at that period, conveyed them to the

most distant parts and brought back cargoes from the ports of India, did much towards the same end. Under the reign of Nero, two centurions were sent by the Emperor to Ethiopia in search of the sources of the Nile, and this expedition is alluded to by Seneca and Pliny. Previously to this, during the reign of Claudius, a Greek philosopher of Egypt, one Hippalus, had struck out with his vessel from the coast, and ventured across the high seas, starting from the Gulf of Adulis (Aden), and arriving upon the coast of India. Another traveller, named Diogenes, was driven by north winds as far as a large island called Menuthias, otherwise Zanzibar. From this time forward all the coast-line was marked upon the marine maps, but the Erythrean Sea (as the Indian Ocean was then called) was believed to be impassable and full of terrible dangers, though more than one Egyptian or Phoenician sailor had endeavoured to sail across it.

One of these experienced pilots, Marinus of Tyre, carefully collected all the geographical information which he could gather from the maritime commerce of Phoenicia and Egypt, and he used it to prepare more detailed and correct maps than were at that time in use, and to compose a book of geography, which, though no longer in existence, is copied from by Ptolemy. That writer says of him, " Marinus of Tyre, the latest of our contemporaries who has cultivated geography, seems to have done it to some purpose, for it is evident that he has made several additions to the former knowledge of this subject, and that he has corrected earlier writings which contained errors that had at first misled him as well as others. This is seen very clearly in his corrections of the Geographical Table." Previously to Marinus of Tyre, a Roman citizen, Pomponius Mela, had written a useful treatise on geography, entitled, " De Situ Orbis," in which he described the countries of the known world, following the circumference of the seas, and beginning with the Mediterranean ; and his treatise, which formed a luminous and rapid summary, was one of the handbooks of geographical study in the Middle Ages.

A Greek geometer, named Claudius Ptolemaeus, born at Pelusa, in Lower Egypt, who was at the famous school of Alexandria in the middle of the second century, formed an idea of writing a general treatise upon Mathematical Geography after the plan traced by Hipparchus in the year 125 H.C. He had prepared himself for this task by a long series of astronomical observations and calculations. In the second book of his " Almagest" he wrote, " I intend to mark the longitude and latitude of the principal towns of each country, to facilitate the calculation of the celestial phenomena which occur there. I shall mark by how many degrees, counting from the meridian, each of these towns is distant from the equator, and I shall also compute, in degrees counted from the equator, the eastern and western distance of each meridian compared with that which passes at Alexandria, for it is after the meridian of that city that I intend to reckon those of the other places on the earth's surface." Ptolemaeus was more of an astronomer and a geometer than a geographer ; he had not travelled at all, and had, therefore, no personal experience, while, excepting the astronomical part of his book, he merely borrowed from his predecessors and contemporaries cosmographic materials which he loosely arranged without sequence or comment. The best features in his work are what he borrowed from the treatise of Marinus of Tyre, and he says, " I resolved to preserve so much of his book as does not require correction, and to throw light, by means of the most recent information, and by a better arrangement of the places on the maps, upon the obscure points of his treatise." Ptolemaeus unfortunately, while preparing his list of all the places in the known world, making eight thousand names, committed the most glaring errors, owing to his having sought to fix the latitude and longitude of the localities by means of astronomical observations.

The Geography of Ptolemaeus, written in Greek, and doubtless translated simultaneously into Latin for the use of persons travelling through the Roman empire, was, in spite of his faults of omission and commission, consulted as being the most useful guide-book during a long journey. The coloured maps appended to it were, perhaps, rectified soon afterwards,

upon new itinerary measurements being taken ; for, previously to Ptolemasus, there existed not only road maps, to which Vegetius refers in his treatise on the Art of War, under the name of itincra picta (coloured itineraries), but <tiK,tt,i (iiniiotatecl itineraries), upon which were marked the day's marches. It was one of these figurative itineraries that the learned Conrad Celtcs discovered in a monastery of Germany, at the end of the fifteenth 'i-iitury, and which his friend Pentinger of Augsburg presented to the Imperial Library at Vienna. This precious document, consisting of twelve maps representing the world as it was known in the third century, forms, so to speak, the explanatory complement of the tract chart of the provinces of the Roman empire, which has been handed down to us under the title of " Antonini Augusti Itinerarium," and which appears to have been drawn by the geographer Ethicus in the fourth century.

These itineraries and maps, which were sold at Rome and in the principal cities of the empire, and which must have often been copied as they passed from hand to hand, were not, in all probability, foreign to the continuous migration of the barbarian hordes which gradually moved upon Italy from the different parts of the world, and systematically followed the same method in order to reach Rome. These invaders, whether coming from the North like the Lombards, the Suevi, the Yandals, and the Goths ; from the heart of Asia, like the Huns ; or from the steppes of Caucacus, like the Alani or the Heruli, had long been kept in awe by the Roman legions ; but, when once they began to burst the barriers and to advance with sagacious caution through the Roman provinces which they ravaged, it was easy to see that they had selected beforehand the territory which they intended to occupy, by the way in which they created frontiers and military stations with not less intelligence than boldness. They did not swerve from the route which they had traced out, and paid implicit obedience to chiefs who had been formed in the schools of Athens or Alexandria.

Thus the study of geography was apparently fatal to the empire, because it demonstrated to its enemies and rivals how vulnerable its very vastness made it, and what facilities were afforded for an invasion by those splendid military roads which enabled countless hosts to arrive by easy stages under the very walls of Rome. The Emperors, it is true, endeavoured for more than a century to stem the tide of invasion, and it is not unreasonable to suppose that they had all the maps and itineraries which facilitated the progress of the invasion destroyed. The teaching of geography was not, however, neglected in the schools, for the historians of the fourth century, Claudianus, Nemesianus, and Ausonius, the Emperor Julian, Ammianus Marcellinus, and Macrobius, display very profound geographical knowledge, which they must have acquired by travel and study. But the special treatises on geography were very rare at this period, and the only works which are known to have escaped a destruction which we may assume to have been a planned one are the Latin " Cosmography" of Ethicus and a few (books of circumnavigation) written in Greek.

As soon as the invading nations had formed themselves into kingdoms upon the Roman soil, and their chiefs had become kings rivalling the Caesars in power, geography resumed its position and reasserted its usefulness. Thus at the court of Theodore the Great, Boethius and Cassiodorus, one born at Rome and the other in Calabria, both of whom rose to the highest dignities in the new kingdom of the Ostrogoths, combined with learning of a very varied kind an extensive and thorough knowledge of geography, which made their services exceedingly valuable. Cassiodorus has disseminated in his " Letters" a mass of valuable information and of interesting remarks concerning places, men, and customs. Boethius himself translated into Latin the books of Ptolemy, so as to put them within the reach of those who did not speak Greek.

In the pagan schools which remained open at Constantinople and throughout the empire of the East, until closed by Justinian in 529, were taught, after the writings of Eratosthenes and Hipparchus, of Strabo and Ptolemy, both cosmography and geography, in addition to simple

astronomy this latter as a guide to the forecast of weather, the variations of the atmosphere, and navigation. Stephen of Byzantium, who lived in the sixth century, composed a large Dictionary of Geography, of which all that remains extant is a dry and useless abridgment. But it may be learnt from the works of the Greek historians of this epoch, especially of Procopius, that geography was considered to be inseparable from history. Thus Procopius and his successor, Agathias, are true geographers. We meet but one Latin geographer in the sixth century, viz. Vibius Sequester, who, in a work dedicated to the nomenclature of rivers, springs, and lakes, seems to have learnt from the poets what little he knew upon the subject. The Christians of Africa still read Syriac translations of the Latin and Greek works on geography by Aristotle, Ptolemy, Pliny, Pomponius Mela, &c., which had been studied after the original texts in the schools of Athens and Alexandria, and these Syriac translations were afterwards retranslated into Arabic, when the Caliphs, successors of Mahomet, had founded Mussulman schools in the countries which they occupied and conquered. Very naturally geography must have had a special attraction for a warlike people which aspired to conquer the world, and to propagate throughout it the religion of the Koran.

The schools of Cordova and Toledo in Spain, as well as those of Bagdad and of D,schindesabour in Asia Minor, accordingly remained open for geographical instruction at a period when geography was no longer taught throughout the West, which was at that time plunged in barbarian darkness.

From the sixth to the tenth century there were but few manuscripts which escaped destruction ; all the coloured maps and traced itineraries were, like the images, ruthlessly destroyed by the iconoclasts. The only remaining notions of cosmography and geography dating from that period are to be found hidden in scholastic encyclopedias, which, like the ark in the Deluge, float here and there amidst the abysses of ignorance. In addition to the encyclopaedic compilations of Martianus Capella (470) and Isidore of Seville, there were a few historians who took some interest in geography : the historian of the Franks, Gregory of Tours (about 590), the historian designated as the " Anonymous of Ravenna," and the historian of the Lombards, Paul Warnefrid (780). There can be no doubt, moreover, that Charlemagne had contemplated the encouragement of the teaching of geography, when this science, not then regarded as a handmaid of politics, resumed its rank at the Palatine School directed by Alcuin, who included it, with dialectics, philosophy, astronomv, and arithmetic, in his course of lessons. Yet it was only a very imperfect and elementary science, for it was confined to the theories of Aristotle, who described the terrestrial globe as being 9,000 leagues in circumference and 2,803 leagues in diameter, while he estimated the sea to be ten times greater than the earth, and asserted that the latter was 1,400 leagues deep from the surface to the central axis, and had an area of 5,000,713 square leagues. Based upon these data, mathematical and astronomical geography could not be other than a chaos of erroneous ideas and misleading traditions.

The genius of Charlemagne, however, extracted therefrom the clever invention of the cadastral measurement, the germ of which is to be seen in the Capitulary Laws of the great KmjMTor, and which eventually, under the feudal regime, gave the geometrical measure of the area of the soil, while carefully preserving the ancient names of the different localities. By means of this descriptive definition of the limits of fiefs, historical geography recovered, after the lapse of centuries, all the topographical details of the territory of the Gauls during the lifetime of Charlemagne and of his successors. The historians and the poets of this period, of whom but a few are known to us, do not give much information as to the state of geographical knowledge, which, notwithstanding the schools founded by Alcuin, seems to have been very scanty. But it is probable that the knowledge of geography was much more advanced in Great Britain and Ireland, for Alcuin was educated in the monasteries of those countries, as also were St. Columba, St. Gall, Theodore, Archbishop of Canterbury, Scotus Erigena, and other savants who came to France, where they founded monasteries and

established chairs for teaching the sciences, and geography was always given a place in their programmes. There was the more need for its cultivation in England, as it was very useful to the traders and fishermen of the ancient port of Dunwich, in the North Sea.

Alfred the Great, King of the Anglo-Saxons (849 901), who, like Charlemagne, was a sovereign of great organizing powers, took a special interest in these studies, and set an example to his subjects by making him- self acquainted, with a view to developing the fisheries and trade, with the islands and coasts washed by the Baltic and the North Seas. Two travelling traders, one a Dane named Wolfstan, the other a Norwegian named Other, wrote an account of their maritime explorations. Wolfstan had explored the Baltic coast, and Other had navigated to the polar seas by way of the coasts of Norway and of Lapland. Alfred the Great, who translated into Saxon the " Universal History" by Orosius, written in the fifth century, added to it, from the accounts given by Wolfstan and Other, the description of an immense extent of country which the Romans had but caught a glimpse of athwart the miraculous stories of a few sailors who had sought to reach the mysterious island of Thule (Iceland), which was looked upon as the extreme limit of the habitable globe. It was owing to him that there were prepared pilots' charts, to enable fishermen to exercise their industry in the remote regions of the Norwegian continent, and to establish a carrying trade with all the ports of the Baltic. Geography, in England as in Germany, consisted at that time of a few rudimentary but practical notions. Thus a canon of Bremen composed, in 1067, a brief description of Denmark, under the pretentious title of " Geographia Scandinaviae ;" while, two hundred years before, an Irish monk, Dicuil, wrote a regular treatise on general geography entitled, " De Mensura Orbis " (Concerning the Extent of the Universe) borrowed from the Latin writers, Pliny, Solinus, Orosius, and Priscian, supplement 3d by some novel remarks upon the northern countries. But this treatise, though it contains an account as to the discovery of Iceland and other interesting facts in contemporary history which the monks had imparted to the author, also contained several errors, but little in the way of commentary. For instance, Dicuil divides the world into three parts, Europe, Asia, and Libya, in which latter he places the source of the Nile, not far from the Atlantic, in the mountains of Mauritania.

There are doubtless but few geographical works during the tenth and eleventh centuries which place the theory of the science in a reliable form, but it may be taken as certain that geography itself was taught wherever education existed. The Greek schools in the empire of the East could not afford to neglect a study which was inseparable from that of history and of philosophy, and geography even became an essential part of politics, as is to be learnt from the treatise composed by the Emperor Constantino Porphyrogenetes for the education of his son, and which bore the title of " De Administratione Imperil." This book, written in the middle of the tenth century, is, in reality, a geographical work, containing a very complete description of Eastern Europe and of a part of Asia. Many cosmographical books, descriptions of travels or of embassies, were written in Greek during the eleventh and the twelfth centuries, but they have not been published. The numerous writers of the history of Byzantium describe the peoples and states in other parts of Europe with a degree of accuracy and detail which testifies to their being well versed in geography.

It was in Islam that the best geographers of that time were to be found. The Mahometan mind had from the first taken to the study of geography, which made immense progress after the eighth century in all the Arab schools. The Caliph Al-Mamoun, son of Haroun Al-Raschid, was noted for his pre-dilection in favour of this science, and he translated into Arabic the Geography of PtolemaDus, adding to it illuminated maps, which latter fact showed that Ptolemaeus's original maps had either been lost or were not reproduced in the Syriac translation. From the reign of Al-Mamoun the Arabs measured an arc of the meridian in order to calculate the size of the earth, and to rectify the calculations of rtolemacus as to the measure of the degree of each of the large circles which were supposed to intersect the earth at intervals of 66| miles. The conquests of the Arabs, their trade by land and sea, and, above all, their religious pilgrimages to Mecca, served at once to enrich their store of know-

ledge both as to astronomical, physical, and political geography. They brought from China the compass, with which the Chinese had been acquainted from time immemorial, and the use of it at sea unquestionably led to a total and almost immediate revolution in the science of geography. The Arabs possessed in the tenth century two learned geographers, Ibn-Haukal and Masoudi, both natives of Bagdad. The first wrote a geographical, political, and statistical description of the Empire of the Caliphs, in the preface to which he said, " I have collected all the information which has made of geography a science interesting to men of all degree." Masoudi introduced into a large encyclopaedic work entitled " Akhbar al Zeman" (the News of the Time) all the documents which he had collected during twenty-five years' travels through Asia and Africa ; but it would appear that this work has been lost, and all that remains is an abridgment made by the author himself under the title of " Golden Prairies," and which itself fills eight volumes. Masoudi deserves to l)e siii-iiained the 1'liny of the Must. A great number of works on geography in the Arab literature of the Middle Ages might be cited, the best known of which is that by Edrisi, a Spanish Arab, who wrote his book at the court of Roger, King of Sicily, in 1154. It was for this prince, a friend of letters and sciences, that Edrisi constructed an armillurv sphere and a terrestial planisphere in silver.

The example of the Arabs was not without its influence upon the renaissance of geographical science in Europe, when the Crusades made a knowledge of geography indispensable. First of all, it was necessary to study all the routes leading to Jerusalem, to prepare itineraries and tract charts for the crusaders ; and in these new and unknown lands, into which eager multitudes were about to penetrate, there was nothing to guide them save the untrustworthy descriptions of the ignorant pilgrims who from the fifth century had undertaken the laborious task of visiting the holy places. This led to an improved study of geography in the schools of the West ; and in the monas- teries, each of which had its library, the monks set to work at copying the writings of the early geographers, such as Strabo,Pausanias, and Polybius, Pliny, Pomponius Mela, Solinus, and Ethicus. These authors were expounded, commentated, and compared with the less ancient and almost contemporary writers. The famous Abbey of Monte Casino, in the kingdom of Naples, was at that time one of the principal centres of geographical lore. Numerous pilgrims who went to or returned from Palestine halted for a day at this abbey, where they were received with the greatest hospitality, and told the story of their travels and adventures to their learned hosts. It was here that Constantino the African, one of the lights of the school of Salerno, retired, after having, when he left the schools of Alexandria and Bagdad, travelled through Egypt and Asia for twenty-nine years. His wonderful lore earned him the reputation of a sorcerer, but the Due de Pouille, Robert Guiscard, whose secretary he was, protected him, and he was able to continue undisturbed his medical and geographical works in a retreat where his curious descriptions of the countries beyond the sea lighted up the hours of repose and recreation which the monks of St. Benedict were allowed to snatch from their labours and prayers.

The University of Paris was not yet founded, but the ecclesiastical schools already flourished in the capital as well as in all the important cities which had their bishop. The teaching of geography was limited at that time to a few rudiments, all more or less erroneous, and it was in the Latin classic poets, such as Virgil, Horace, and Ovid, that students got some idea of the facts relating to descriptive geography. Nothing can prove more clearly the ignorance which then prevailed as to the shape of the globe than the rough designs which are to be met with in a few manuscripts of the eleventh century, the authors of which could never have seen Ptolemy's Geography. The geographical descriptions which occur in some of the poetry of the time were much nearer the truth, for the poets of the eleventh and twelfth centuries, such as Ausonius and Venantius Fortunatus, wrote of countries and places which they had seen. It was in this way that Marbodius, Bishop of Rennes, who died in 1123, sketched in his didactic poetry the geography of Brittany, giving it a picturesque character quite in harmony with nature.

There were, however, some few men of genius to whom the general study of science had, even at that period, opened the arcana of astronomical and philosophical geography. Such was the master of Roger Bacon, that man of learning whose real name is not written in the works of his illustrious pupil, and who appears to have been one Mehairicourt, a native of Picardy. Roger Bacon always speaks of him as Master Peter. Philosopher, mathematician, and geographer, he had travelled in Europe and Asia before coming to Paris, where he taught Roger Bacon, about 1230, that which no other teacher had the power to impart to him. He had constructed a sphere which imitated tlit' motion of the heavens, and it was through the inter-mediary of astronomy and mathematics that he grappled with the most arduous questions of geography. Roger Bacon, in the fourth part of his " Opus Majus," devoted almost entirely to the description of the earth, doubtless transcribed without change the lessons which he had received from Master Peter ; but he notes the errors of the ancient geographers, refutes the opinions of Pliny and Ptolemy, and brings forward a host of fresh problems which science did not solve till long after his time. Not only did he describe very accurately regions not yet known and scarcely hinted at, but he further maintained that Africa extended very far south, that it had inhabitants the other side of the equator, that the temperature of the pole was endurable, that the Indian Ocean washed the southern coasts of the Asiatic continent, and that the earth was ten times more thickly peopled than was believed to be the case.

At the time Bacon committed to paper, under Master Peter's dictation, these ingenious theories which changed the face of geographical knowledge, Albertus Magnus was pro-pounding to attentive audiences numbered by the thousand, from his chair in the University of Paris, a system of geography stripped of all commentaries, and teeming with errors which he did not erase when he embodied his public lessons in a treatise entitled " DeNatura Locorum."

Roger Bacon appreciated in the following terms the utility and main object of a science which was still groping its way in the dark : " Geography, like astronomy and chronology, has its roots in mathematics, inasmuch as it must repose upon the measurement and shape of the inhabited globe, and on the precise determination of latitudes and longitudes. But the care-lessness of the Christian peoples is such that they do not know one-half of the globe which they inhabit. Yet the first important points to be settled are the measurement of the earth, the determining of the position of towns and of countries, and the adoption of a fixed degree for the longitudes, starting from the western extremity of Spain to the eastern extremity of India. This immense work can only be accomplished under the auspices of the Holy Apostolic See, or of a monarch who would undertake all the costs of the enterprise, by remunerating the savants employed upon it. Moreover, it is impossible to form an opinion of men unless one knows what climate they inhabit, for if the products of the animal and vegetable kingdoms are dependent upon the climate, how much more must this be the case with the manners, the character, and the constitutions of peoples !" Thus we see that Roger Bacon's sagacity and spirit of intuition enabled him to anticipate by five centuries the philosophical results of modern science.

The thirteenth century could not but restore geography to its place of honour, when the Crusades were taking so many people to the East, and when the devlopment of classical study, favoured by the ardour of the students who flocked to the schools of the Paris University, fostered a taste for encyclopaedias edited upon the same plan as Pliny's " Natural History." Geography was destined to occupy a permanent place in these vast compilations, and Vincent of Bea'uvais, who, by order of St. Louis, had intended to present, in a voluminous compilation entitled " Speculum Majus," the compendium of the scientific, historical, and philosophical information of his time, instead of merely putting together all the documents and systems which antiquity furnished him with concerning the history of geo-graphy and the description of the universe, sought out the travellers who had visited the countries which he intended to describe, and so obtained fresh information, which,

unfortunately, he failed to get revised by a competent critic. Nevertheless, his book is a valuable one, and he deserves great praise for his “ Speculum Naturale,” in which he treats of the position of the skies, of cosmography and geography, citing not more than a dozen Latin authors.

From this period the accounts of travellers in Upper Asia enabled the inhabitants of Europe to form more accurate and extensive notions concerning this part of the world. The story of Prester John, alluded to in the previous chapter, was the principal cause of these travels, and Pope Innocent IV. and Louis IX. both determined to ascertain what truth there was in these travellers' tales. The Pope accordingly sent two missions into Asia; one confided to monks of the Franciscan order, the other to Dominicans. The first proceeded to Mongolia, and the second to Persia and Armenia. The story of the first mission was written by Brother John dc Piano Carpini, who arrived with his companions upon the banks of the Volga. The embassy sent to the Great Khan of Tartary by St. Louis a few years later was of greater service to geographical science, and the Flemish Franciscan monk, Ruysbroeck, generally called Rubruquis, gave many interesting details in the account which he wrote as to distant countries of which he could not ascertain even the name. Yet for another two centuries the existence of Prester John was generally believed in.

Another traveller, Marco Polo the Venetian, who, soon after Rubruquis and John de Piano Carpini, went to seek his fortune in Tartary, and who for twenty years held a high post at the court of the Great Khan, availed himself of his residence and of his excursions in Asia to collect a mass of valuable notes about the geography of the countries which he inhabited for such a lon'g time. Upon his return to his country in 1298, he dictated an account of his journeys to a romance-writer, one Rustician of Pisa, who took them down in French eight years before Marco Polo had them written in Italian. This account, valuable and truthful notwithstanding the great credulity of the author, contained the fullest and best description which then existed of Tartary, Mongolia, Cathay or China, and other parts of Central Asia, and was, so to speak, the first effort of picturesque geography. Marco Polo found many imitators, but none of them equalled him. Travellers in Asia up to the fifteenth century consisted almost entirely of Franciscan or Dominican monks, amongst whom may be mentioned Pucoldi of Monte Croce, John of Monte Corvino, Oderic of Frioul, and John of Marignola ; but the most famous of all was an Englishman, John de Mandeville, who, from 1322 to 1356, explored nearly the whole of the known world for the mere pleasure of travelling, and who, after a pilgrimage to the Holy Land, explored 'part of Africa and nearly the whole of Asia. The story of his travels, written in English, teems with stories which do not say much for his judgment or powers of discrimination. Several travellers, who had seen fewer countries, displayed better powers of observation and more knowledge of geography, amongst them being Bertrandon de la Brocquiere, a Burgundian gentleman, who was one of the last to start with the pilgrim's staff for Jerusalem.

The caravan travellers seem to have stimulated the energies of travellers by sea, and hydrography took its place beside geography. The first navi- gators who explored the western coasts of Africa were Portuguese. In the beginning of the fourteenth century (in 1315), Alonzo Gonzales Balduya advanced as far as Cape Bojador, almost within sight of the Canary Islands. The island of Madeira, which an Englishman, Masham, caught sight of in 1344, was not positively discovered till 1417 by Gonzales Zarco, who took possession of it on behalf of his master, John I., King of Portugal. That king’s son, Prince Henry, surnamed the Navigator, was passionately fond of maritime exploration, and devoted forty-eight years of his life to it. The object of his expeditions was not merely to discover new countries rich in

gold, and offering fresh opportunities for commerce ; but, in trying to reach the equator, this enlightened prince had mainly in view the increase of geographical knowledge. The Canary Islands were already known, and the King of Castile’s flag had floated there since 1345, but

the Portuguese expeditions advanced as far as the mouth of Rio Grande, and founded establishments at the islands off Cape Verde. In these successive explorations, which lasted half a century, under the leadership of Gil Eanes (1442), of Nuno Tristam (1443), of Alvaro Fernandez (1448), and of Cadamosto (1454 56), hydrographic surveys had been made of about a third of the African coast, as far as the great South Cape. After the death of Prince Henry, Joiio de Santarem and Pedro de Escalona, who had explored the Guinea coast in 1471, crossed the line and opened up the navigation of the southern hemisphere. In 1484 Diego Cam reached the sixth degree of southern latitude at the mouth of the Zaire, and two years later Bartholomew Diaz, who had ventured out into the ocean, which was still called the Impenetrable Sea and the Dark Sea, perceived the Cape of Good Hope, or Stormy Cape, at the extreme end of Africa.

These African islands and coasts had already been frequented, for in 1471, when the Portuguese landed in Guinea, they were much surprised to find there a French trading depot called Le Petit Dieppe, which sailors from Dieppe had founded a century before. These were the same men who knew of the existence of North America a century before Christopher Columbus discovered the Antilles. Moreover, in 1395, the fleet of the brothers Zeno, freighted at Venice by the traders, had crossed the Atlantic under the guidance of a Dieppe pilot, who pointed out to it the northern coast of America ; but all these discoveries, due to commercial enterprise and the love of gain, and achieved by daring adventurers, were in no way useful to science, for they were kept, secret when they were likely to be beneficial to some branch of maritime commerce, while no importance was attached to them when they resulted in no material gain. It was not until the fifteenth century that navigators began to write an account of their voyages, or to have them recorded by the cosmographers who were generally to be found on board. But these records were either kept secret or were shown to only a very few people, as the navigators looked upon them as property over which it was necessary to keep close watch. Thus the curious voyage of Cadamosto, “ Prima Navigatione alle Terre de’ Negri” (First Navigation to the Land of Negroes), did not appear until 1507.

These travels were more useful to map-makers than to geographers, for every traveller and navigator found a map indispensable, and after making one for himself, he added to it the result of his own discoveries. Previously to the fourteenth century maps were very scarce, and those which did exist were faulty and incomplete. The oldest general map of the world dating from the Middle Ages is that which Marino of Venice presented to Pope John XXII. in 1321. This map, which appears to be an imitation of the Arab maps, is nothing more than a picture in which the relative position of places and countries is given almost hap-hazard, without any sign of parallels or meridians. A hundred and forty years later, a Camaldulan monk, Fra Mauro, painted upon the wall of one of the rooms in his monastery, in the isle of Murano, near Venice, an immense planisphere, in which he grouped all the known geographical facts of his time. The first marine maps, drawn by Italian, Portuguese, or Spanish pilots, are not of an earlier date than Marino’s map of the world, but they were very numerous in the following century. These charts, which are as a rule remarkable for the excellence of their drawing, are wonderfully accurate, and often contain allusions to celebrated sea voyages, together with
references which enable the reader to follow the phases of these voyages in chronological order, and to ascertain their results. It may safely be said that every pilot was capable of drawing for himself a very minute coast chart of all the seas in which he navigated.

This abundance of charts and maps, especially in countries which possessed a navy, explains how it was that copper engraved maps were almost contemporaneous with printing in movable type, which was invented in 1440, but kept a secret by the town of Mayenne until 1466. The first edition of Ptolemy’s Cosmography was printed in folio at Vicenza, by Hermann Levilapis of Cologne, in 1462 ; but this edition had no maps. Nicholas Denis the Benedictine had, however, composed for Ptolemy’s book maps which were engraved on

copper by Andrea Beniucasa. But in the meanwhile a new set of maps, also intended for Ptolemy's book, was admirably drawn by the printer, Conrad Sweynheym, the associate of Pannartz, who had removed his presses to Rome ; and these maps, numbering twenty-seven, in which the letters were stamped with jewellers'punches and hammered, were completed by the Alsacian Arnold Buckinck, to illustrate the edition of Ptolemy which was printed at Rome under the superintendence, so far as the letterpress was concerned, of Domitius Calderini, and which appeared in 1478. Other editions, with maps engraved on wood and coloured with the paint-brush, appeared in succession in Italy and Germany. The Greek text of Ptolemy was carefully revised by the geographers, who sought to amend and interpret it, in order to improve the Latin translation, which was continually being reprinted by the thousand ; for the Greek text was not printed until 1533.

The publication of the Latin translation of Ptolemy was followed by that of several ancient geographers, and these primitive editions testified to the sympathy of the lettered public for geographical science. The Popes Paul II. and Sixtus IV. gladly accepted the dedication of the editions which Conrad Sweynheym and Arnold Pannartz printed at Rome. Strabo, translated into Latin, appeared in 1469 ; Pliny in 1473 ; Solinus, at Milan, in 1471, and at Paris in 1473. These works were also reprinted at Venice, where they were eagerly bought up. The study of geography at this period held a large place (in the system of public education, and what proves it even more clearly than contemporary evidence is the quantity of small editions of Pomponius Mela which were printed for use in the universities throughout Europe.

There can be no doubt that this profusion of maps and books on geography gave a general impulse to sea voyages and expeditions. The Portuguese, after spending a whole century in their discovery of the western coasts of Africa, prepared to push forward into the Indian Ocean by way of the Cape of Good Hope, so as to extend their commercial, military, and naval power to Asia as well as to Africa. Diego d'A/ambuza created in 1481 the first European establishment in Guinea, which had been explored twenty years beforehand by his compatriot Cintra ; and Joan Cano discovered Congo in 1484. But the boldest mariners, notwithstanding their possession of the compass, which had been discovered in the twelfth century, would not venture across the Atlantic, which was believed to be boundless and full of perils. The pilots, however, discussed amongst each other whether or not a vessel, by steering continually westward, would reach the most easterly islands of the Indian Ocean. This was the idea formed by the Genoese pilot, Christopher Columbus, born in 1446, and accustomed to the sea from his childhood. He says in one of his letters, " God imparted to me great knowledge of maritime matters, and some knowledge of the stars, of geometry, and of arithmetic. Moreover, He granted me the power to delineate globes, and to indicate the proper position of towns, rivers, and mountains." He was, therefore, a geographer, and still more a chart-maker.

A Florentine astronomer, Toscanelli, showed him a map upon which he had indicated the route to follow in the Atlantic in order to reach the Indian isles, for it was not supposed that there was any land between Europe and Asia. Columbus, as ho himself states, only intended at first to " seek for the East by way of the West." The advice of Toscanelli induced him to follow this new route, but it was in vain that he applied to the Republic of Genoa and the King of Portugal for funds to equip his vessels. After eight years of fruitless efforts he obtained from Ferdinand, the Catholic King of Arragon, and Queen Isabella of Castile, three small vessels, with which he started from the port of Palos, in Andalusia, on the 3rd of August, 1492. In March, 1493, he returned to Spain, after having discovered the islands of San Salvador, Cuba, and San Domingo. Appointed Viceroy of the new lands which he had acquired for Spain, he returned there in the following year, but it was not until his third voyage in 1498 that he discovered the continent and explored the coast of South America.

The discoveries of Christopher Columbus, whose name did not apparently obtain the notoriety which it deserved in after ages, produced a great effect throughout Europe. The first indications, vague and incomplete as they were, were received with enthusiasm, and the detailed information by which they were followed left no doubt as to the existence of these vast unknown lands. They led to the fitting out of a great number of maritime expeditions, in which science had no part, and the object of which was to take people to what was called the gold country. A great impulse, however, was given to geography, and throughout Italy and Spain the principal families devoted large sums to the formation in their palaces of collections of books, maps, and instruments bearing upon nautical astronomy, hydrography, and all the branches of ancient and modern geography. These families, animated by generous motives, spent vast sums in promoting voyages of exploration and discovery to the new parts of the world.

An adroit Florentine adventurer, named Amerigo Vespucci, was enabled, by the munificence of one of these Italian families, to equip a small flotilla, and make several voyages in the seas explored by Christopher Columbus. These voyages were probably undertaken for commercial purposes ; but Vespucci gave them the appearance of having been made in the cause of geography by publishing, in the form of a letter, the description of new lands which he claimed to have discovered before Christopher Columbus, to whom he made no allusion. This letter, written in Italian and of which a great many copies were printed, was widely circulated throughout Italy, the inhabitants of which were much pleased at the success of one of their countrymen, and at once gave to the New World the name of America in his honour. The latter, after the death of Columbus in 1506, continued his voyages along the American coast, and stoutly maintained that if Columbus had discovered the islands of that continent, he was the first to have found the continent itself. His statements were believed, and the name of America was finally given to a continent which he had merely explored in company with several Spanish, French, and Portuguese navigators, such as Hojeda, Pinzon, and Cabral.

The Portuguese seemed for a time to abandon their expeditions to the New World, being so much engaged in establishing their trading stations upon the west coast as they had already done upon the east coast of Africa. Albuquerque and Vasco de Gama had won for them the islands of Goa and Ceylon, and their possessions upon the Asiatic shores increased rapidly. But their navigators could not long remain indifferent to the commercial current which was drawing all the navies of Europe into American waters, and they entertained the hope of discovering in the new land a passage into the Indian Ocean. Thus their voyages had a certain scientific tendency, and were calculated to serve the progress of geography. Gaspar Cortereal sought in vain northward this passage communicating with Asia. He entered the Gulf of Labrador, and ascended the St. Lawrence in 1500, where he was stopped by the ice. Three years previously a Venetian trader named Cabotto, settled at Bristol, had attempted to discover in this direction a passage to India, but the only result of his explorations was the discovery of Newfoundland. The intrepid Magellan was more fortunate in his researches along the east coast of South America, and he discovered in southern latitudes the straits which still bear his name, and which opened up an entrance into the South Sea, across which he pursued his voyage to the countless islands of Polynesia (1521). Magellan, though a Portuguese, was in the service of Spain when he undertook this long and perilous expedition, which had such brilliant results for geographical science.

The object of the expeditions of the Spaniards into America, which followed one another in rapid succession, was to take possession of the country in the name of the King of Spain, and to enrich a few adventurers of various nationalities. Diaz de Solis and Pinto discovered Yucatan in 1507, having disembarked at Rio Janeiro ; Pontius de Leon discovered Florida by chance in 1512 ; Vasco Nuiies saw Peru in 1513, and Pizarro conquered it in 1526. These conquests and discoveries were not of any immediate service to geography, for the navigators thought less of studying the country than of working the gold and silver mines ; but when

naturalists and men of letters, such as Oviedo y Valdes, J. Varezzani, Ramnusio, and other savants went to the country, its geographical features became better known.

King Francis I., who would have liked France to have had a share in the new continent, gave a very conspicuous place to geographical study in the Royal College founded by him. He encouraged most of the voyages undertaken during his reign, amongst which must be mentioned that of Jacques Cartier, who discovered Canada in 1533. Other French travellers not less devoted to the cause of science explored both hemispheres, and collected, during their distant pilgrimages, very useful information of a geographical kind ; amongst them being Pierre Gilles, Andre Thevet, and Pierre Belon, who published excellent Cosmographies on the East ; Jean Parmentier and Francois Nicolay, who visited the two Indies, and brought back much interesting information. Amongst the most indefatigable of travellers were the companions of St. Ignatius and of Francois Xavier, who commenced about this time to write the history of their missions in the hitherto idolatrous lands whither they went to preach the gospe.

Geographical publications were in such demand throughout France at this period that the Paris booksellers ventured the simultaneous publication, during the reign of Charles IX., of two enormous compilations taken from the celebrated " Geographia" of Sebastian Munster, and bearing the title of " Cosmographie Universelle," the one by Francois de Belleforest, and the other by Andre Thevet, and both illustrated with maps and engravings.

The English and the Dutch did not hold aloof from this passion for discovery and exploration in Africa and America. The Dutch had also sought in a northerly direction for a direct route to the Indian Ocean, but they were driven back by the ice at the North Pole. England, while at war with Spain, sent two fleets, commanded by Drake and Cavendish, to the coast of North America to destroy the Spanish settlements ; and Drake, after he had accomplished this task, sailed to Cape Horn, and round it as far as Vancouver's Land, while John Davis had been extending his Antarctic explorations far into the frozen waters of Greenland.

The savants of the Netherlands seem to have acquired the monopoly of the works illustrating the progress in geographical knowledge effected by such expeditions. Abraham Oertel, a Fleming of Antwerp, published in 1570 the first Atlas of modern geography, under the Latin title of " Theatruin Orbis Terrarum" (Theatre of the Terrestrial Globe). Gerhard Kauffman, surnamed Mercator, a native of Rupelmonde, also published in 1594 a large Atlas executed with the utmost precision and elegance, and very remarkable from a mathematical point of view. These two magnificent works soon obtained a great reputation, and the learned Vossius was justified in his declaration that " geography and chronology have become the two eyes of history."

Science and literature in the Middle Ages and at the period of the Renaissance ([1877])
Author : Jacob, P. L., 1806-1884
Subject : Middle Ages ; Renaissance ; Science — History ; Literature, Medieval ; Art, Medieval
Publisher : London Bickers
Language : English
Digitizing sponsor : MSN
Book contributor : Robarts — University of Toronto
Collection : robarts ; toronto
Source : Internet Archive
http://archive.org/details/scienceliteratur00jacouoft
Edited and uploaded to www.aughty.org
June 14 2013