

WHAT THE CHURCH HAS DONE FOR SCIENCE.

From a Lecture by Rev. J. A. Zahm, C. S. C.

Every student of history knows that the great Universities of Europe were founded by Catholic kings and princes, and often under immediate Papal inspiration. Away back in the Middle Ages, and long before the appearance of the Reformation, Oxford and Cambridge, Aberdeen and St. Andrew's, Upsala and Copenhagen, Paris, Toulouse, and Montpellier, Freiberg, Leipsic, Heidelberg, Tübingen, Würzburg, Craoov, Prague, Vienna, Bologna, Naples, Pisa, Turin, Rome, Salamanca, Seville, Valladolid, Coimbra, Louvain, were celebrated seats of learning, and attended by thousands of students—some instances the number exceeding 10,000 for one University, something unknown in modern times—long before Luther rose in rebellion against the Church, and sounded that note of discord that almost destroyed the social and intellectual harmony of Christian Europe.

In these centres of intellectual activity genius had full play; and the mind, untrammelled in its operations, was free to range over the entire realm of thought, and to enter every department of knowledge, sacred or profane. Here were taught all the branches of art and science; here we find the first beginnings of many of those discoveries which, with subsequent development, have excited the admiration of a wondering world; and here (to quote Carlyle), 'nearly all the inventions and civil institutions whereby we yet live as civilized men were originated and perfected.'

I have said that it is to the schools and scholars of mediæval Europe that we owe the inductive or experimental method of study, which has contributed so materially to the advancement of natural and physical science. We owe it, among others, to Gerbert, afterwards Pope Sylvester II. (born A. D. 920; died, 1003), who was reputed to be the greatest scholar of his age; to Albertus Magnus, the towering genius of the thirteenth century, and to his great contemporary, Roger Bacon. I know that the Earl of Verulam, Lord Bacon, has been claimed as the originator of the inductive system of philosophy; but any one who has read aught of the history of science knows full well that this system was accepted and followed centuries before Lord Bacon was born.

Far back in the thirteenth century the illustrious Dominican friar, Albertus Magnus, writes in one of his works: 'All that is here set down is the result of our own experience, or has been borrowed from authors whom we know to have written what their personal experience has confirmed; for in these matters experience alone can give certainty.'

Roger Bacon, an English monk of the Order of St. Francis, was so far in advance of his age that the erudite historian of 'The Inductive Sciences,' Dr. Whewell, declares that 'it is difficult to conceive how such a character could then exist.' Speaking of one of the works of the learned friar, the 'Opus Majus,' he remarks: 'I regard the existence of such a work as the 'Opus Majus' at that period as a problem that has never yet been solved.' Continuing, he says: 'It is indeed an extraordinary circumstance to find a writer of the thirteenth century not only recognizing experiment as one of the sources of knowledge, but urging its claims as something far more important than men had yet been aware of, exemplifying its value by striking and just examples, and speaking of its authority with a dignity of diction which sounds like a forerunner of the Baconian sentences uttered four hundred years later. Yet this is the character of what we find.' He then quotes the following paragraph from the 'Opus Majus' of the Doctor Mirabilis:

Experimental science, the sole mistress of speculative sciences, has three great prerogatives among other parts of knowledge: first, she tests by experiment the noblest conclusions of all other sciences; next she discovers, respecting the notions which other sciences deal with, magnificent truths to which those sciences of themselves can by no means attain; her third dignity is that she, by her own power, and without respect of other sciences, investigates the secrets of nature.

W. Stanley Jevons, in his admirable 'Principles of Science,' speaking of the work of Lord—not Friar—Bacon, says: 'It is a great mistake to say modern science is the result of the Baconian philosophy; he mistook the true mode of using experience, and, in attempting to apply his method, ridiculously failed. Whether we look to Galileo, who preceded Bacon, to Gilbert, his contemporary, or to Newton and Descartes Leibnitz and Huyghens, his successors, we find that discovery was achieved by the very opposite method to that advocated by Bacon.'

J. W. Draper, whom no one will accuse of being partial to Catholic interests, attributes the great work of reform in the methods of scientific investigation to that universal genius of the fifteenth century, Leonardo da Vinci. 'To him, and not to Lord Bacon, must be attributed the renaissance of science. Bacon was not only ignorant of mathematics but depreciated its application to physical inquiries. He contemptuously rejected the Copernican system, alleging absurd objections against it. While Galileo was on the brink of his great telescopic discoveries Bacon was publishing doubts as to the utility of instruments in scientific investigations. To ascribe the inductive method to him is to ignore history. His fanciful philosophical suggestions have never been of the slightest practical use. No one has ever thought of employing them. Except among English readers, his name is almost unknown.'

I quote these passages, and dwell thus at length on the point to which they relate, because I wish to show you that

Catholic scientists were not only acute observers and industrious investigators, but that to them is due the inductive method that is now universally employed in scientific research. This is important. It is claimed as one of the great glories of a later age, but, as we have seen, without foundation. Introduced by the monks of the Middle Ages, and continued by their successors, it was, later on, employed by the professors of science in the universities of Italy and other countries, until the time of Galileo and his school, when it may be said to have reached its culmination.

It was by studying in accordance with the principles of the inductive philosophy—by insisting on experiment—that mediæval and modern scholars have been able to make such giant strides in natural and physical science. Laying aside the speculative and metaphysical systems of the Greek and Alexandrian schools, and questioning nature directly, Galileo and his pupils (many of them ecclesiastics) were able to accomplish more in a few years than the philosophers of Greece and Rome had achieved during the long intellectual ascendancy of their respective countries. During the 600 years that the schools of Athens were open less of actual work was done in physical science than Galileo, unaided and alone, accomplished in a lifetime. The difference in the result was due, I repeat it, wholly and solely to the method employed by the Italian philosopher—a method for which Galileo was indebted to the monks of the Middle Ages no less than to his own transcendent genius.

From what I have just said, it is evident that our estimate of the alleged "Dark Ages" must be quite different from the one which is so frequently given. This period of time was not only an Age of Faith, but, to borrow the words of Ruskin in a recent lecture, "an age which was eminently productive of, eminently under the governance and guidance of men of the widest and most brilliant faculties, constructive and speculative—men whose acts had become the romance, whose thoughts the wisdom, and whose arts the treasure of a thousand years."

I have shown you that we are indebted to the Church for the correct system of scientific study. Can it likewise be proved that we owe anything to her or her children for the application of this system to actual and successful work? In other words, have Catholic scientists been distinguished for any important inventions or discoveries, or anything that should entitle them to the lasting gratitude of their race? Yes; and these are the questions that I now propose answering, by recounting, as briefly as may be, some of the more important contributions made to science by the sons of Holy Church.

Let us commence with geography—the science which teaches us concerning the earth on which we live. Has it ever occurred to you that nearly all the knowledge we have of the earth's surface comes to us from Catholic sources? Far back in the sixth century we have an Egyptian monk, the learned cosmographer Cosmas Indicopleustes, who, according to Malte-Brun, an unprejudiced critic surely, was the author of the only original work of that epoch, and who, as a geographer, was scarcely less worthy of consideration than Ptolemy. After him come the missionaries of the Gospel, who, at the command of the Popes, went on their errands of charity to parts of the world until then unknown, and on their return gave the people of Europe a knowledge of the countries which they had visited. In 1246 Father John de Piano Carpino, accompanied by some Franciscan monks, was sent by Innocent IV to Kayuk Khan, the Emperor of Tartary, and journeyed as far as Thibet. In 1253 Father Rubruck, another Franciscan, went, by the order of Louis IX of France, in search of Prester John, and penetrated farther into Asia than had any other European. These two apostolic friars, together with Ascelin, also a missionary, are, according to the testimony of Malte-Brun, as deserving of the eternal gratitude of geographers as are the Colombuses and Cooks of a later age. They stimulated others to explore unknown lands, and thus contributed greatly to the advancement of geographical knowledge. Sir John Mandeville, the celebrated English traveller of the thirteenth century; Vasco de Gama, and even Columbus, were indebted to them for much information in their journeys and voyages of exploration.

But the grandest discoveries in the Orient at this period were made by the illustrious Venetian traveller Marco Polo, whom the great geographer Malte-Brun pronounces the Humboldt of the thirteenth century. Going with his father, uncle, and a few monks to the Pope to receive the Pontiff's blessing, they set out in 1271 for the court of Kublai Khan, the Tartar conqueror of China. After a journey of more than three years, they reached a city near the present site of Peking. After residing twenty-four years in the East, travelling much of the time, Marco Polo returned to his home and wrote an account of his travels, which first made known the existence of many of the countries and islands of the East, including Japan.

It was Columbus, sailing under the banner of the Cross, who discovered the New World; Vasco de Gama, carrying a flag on which was the cross of the military order of the Most Holy Redeemer, first doubled the Cape of Good Hope, and reached the East Indies; Magellan, following the Cross and the standard of Castile, first rounded Cape Horn; and, although he did not get any farther than the Philippine Islands, where he met his death at the hands of the natives, his ship, the Santa Victoria, continued her journey, and, going by way of the East Indies and the Cape of Good Hope, was the first to effect the circumnavigation of the globe. Cortez and Balboa, and their associates, explored Mexico and Central

America; Pizarro and his countrymen, the unknown lands of South America; and De Soto, the territory bordering the northern portion of the Gulf of Mexico.

The sons of Catholic France went to Canada and what is now known as British America, and made known to their brethren in Europe the countries they had visited, and the manners and customs of their inhabitants. La Salle and Father Marquette, a Jesuit; Hennepin and Membre, Franciscans, explored the great chain of lakes from Ontario to Superior, and the lands and tribes adjacent, and were the first to journey from the source to the mouth of the Father of Waters. We have only to look over the maps of the different countries of the world to recognize the handwriting of the children of Holy Church. Everywhere, in spite of the many changes in names that have been introduced by writers and map-makers of a later age, we find cities, countries, islands, lakes and rivers bearing names that could have been suggested only by Catholic hearts, and souls ever mindful of the glory of their Church and of her saints, and of the grandeur of the doctrines and mysteries which she inculcates.

The western hemisphere is named after Amerigo Vespucci, a Catholic navigator, who visited the New World shortly after Columbus. The first map of any value of the great Empire of China, the Atlas de la Chine, was made by Jesuit priests. And generations before the times of Burton, Speke, Livingstone and Stanley, the tribes of Central Africa had witnessed the labors of the missionary who had come to bring them the glad tidings of the Gospel. Only a few years ago the attention of the scientific world was called to a terrestrial globe in Lyons, France, that long before had been constructed by the Franciscan Fathers, which showed many geographical features whose discovery had been credited to modern explorers.

Among the contemporary explorers of the "Dark Continent" is the well-known French ecclesiastic, Abbe Debaize. And among those who have specially been honored in late years for their contributions to geographical knowledge is Father Desgodins, the learned explorer of the frontiers of Thibet, and Father Petitot, who has recently been made the recipient of a gold medal for his geographical labours in Alaska, as has also been the Lazarist missionary, David, for his researches on the geography and natural history of China.

Celtic Blood on the Bench.

Ireland's representation on the New York bench is surprisingly large. Three of the Supreme Court judges—Donahue, Brady, and Barrett, are of that nationality. Judge Barrett who is one of the most esteemed judges in the State, was born in Ireland, and has been in New York since his boyhood. Then there is Judge Charles G. Daly, who is well known as president of the Geographical society, is also of Irish stock. His namesake Judge Joseph F. Daly, who is following in Barrett's footsteps towards distinction, is of Irish parentage. The principal criminal judge, Frederick Smyth, of whom everybody (the criminals excepted) speaks in highest terms, is a native of Ireland. The criminal bench of New York has not been occupied by a more upright man. Of the nationality of Richard O'Gorman, now a judge in the Superior Court, it is not necessary to speak. Of the minor judges in the 'district' courts and police courts, more than half are on the Irish side, either by birth or parentages. The Irish certainly have no reason to complain of moderate representation in the New York judiciary, for in this particular they are well ahead of any other nationality.

The Nationality of the American Catholic Hierarchy.—The Catholic Church in the United States has one cardinal, fourteen archbishops, and sixty-one bishops. Of these, nineteen are of Irish birth: Archbishops Kenric, Ryan, Feehan, and Bishops Conroy, Fitzgerald, Tuigg, O'Reilly, Bradley, Moore, Hennessy, Hendricken, Hogan, Ireland, Kean Manogue, Mullen, O'Connell, O'Farrell, and O'Connor. Fourteen are of Irish descent: Cardinal McCloskey, Archbishops Gibbons, Williams, Corrigan, and Riordan, Bishops Ryan, McQuaid, Shanahan, McNIerney, McMahon, McCloskey, Kain, Gallagher, Healy, and Cosgrove. The nine following are mainly of English origin: Archbishop Elder, Bishops Becker, Chatard, Grace, Manucy, Spalding, Wadhams, Watter, and Northrop. Nine are natives of Germany—Archbishop Heiss, Bishops Baltes, Borgess, Fink, Flasch, Zunger, Krautbauer, Richter, Seidenbush; Bishops Dwenger, Wigger, and Rademacher are of German descent; and Bishop Gross of mixed German and Irish origin. France has given eight Bishops to the United States—Archbishops Leray, Lamy, and Salt-petre; Bishops DeGoesbriand, Mach-coeuf, Neraz, Robot, and Furier. Of the remainder, four are Belgians—Archbishop Saghers, Bishops Bruns, Maes, and Glorieux; two are Spaniards—Archbishop Alemany and Bishop Mora. Bishop Gilmour is a native of Scotland, Bishop Marty of Switzerland, Bishop Janssens of Holland, and Bishop Vertin of Sclavonia.

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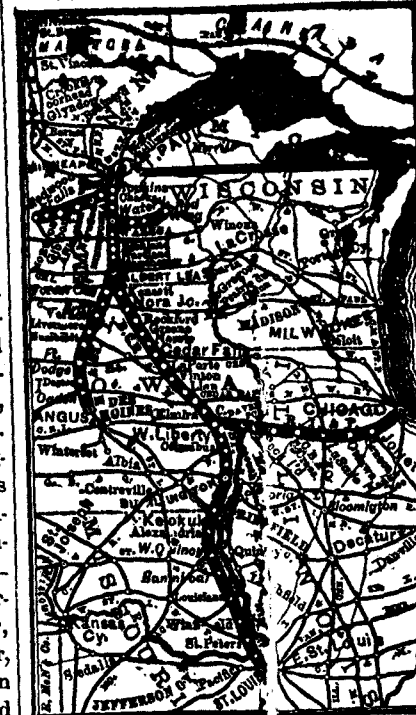
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