THE FRIENDS AND THE FOES OF SCIENCE.

DURING the past few decades many important chapters of history have been rewritten, and many statements, which a German writer has well characterized as "historical lies," have been rejected as never having had any foundation in fact. The chapter concerning the inductive sciences, and especially the relation of these sciences to the Church and to those who have been in communion with the Church, is yet to be written. We want a historian who can distinguish true from false science; who can discriminate between theory and doctrine; who, in a word, can point out to us who are the real friends and who are the real foes of true science.

If we look over the field of science to-day, we shall find that the so-called leaders of modern thought would have us accept the flimsiest hypotheses and wildest speculations as the unquestionable, ultimate results of scientific investigation. We shall discover, also, that these alleged "advanced thinkers" are men without faith and generally men who deny the existence of God. We shall see, too, that they are popular, and that their theories are popular because they are sensational and because they run counter to the traditional teachings of our race, and more particularly because they are opposed to the truths of revelation and the positive doctrines of the Catholic Church. A glance will tell us of the lack of unanimity in the conclusions reached by these popularly-regarded and applauded representatives of science; that they differ as much from one another as to what is scientific truth as do the same class of exponents of science of one age differ from those of the age succeeding.

If we extend our view back beyond the "living present," and consult the records of the past, we shall learn that the most energetic and successful workers in every department of science, and the greatest champions of progress, were those who were the most devoted sons of Holy Church, the most consistent believers in her teachings. The friends of the Church, of revelation, of sound doctrine, have ever been the friends of true science. On the other hand, science has known no greater foes than those who have actively opposed the Church, denied her dogmas, or called in question her divine origin.

In view of these undeniable historical facts, we shall, in this paper, discuss the principles that give rise to such conflicting opinions, such false and sensational conclusions; inquire why it

is that men of ability, as many of our scientific professors unquestionably are, fall into such egregious errors and ridiculous absurdities; and, finally, shall show, in the light of history, what a spirit of intolerance has ever reigned outside of the Catholic Church; a spirit, as intolerant of true science as of Catholic dogma; a spirit, that has been as antagonistic to scientific progress as it has been to the propagation of the gospel, and a spirit too, which has headed a persecution as bitter and as protracted in matters of science as any recorded in the annals of religious development.

One need not, indeed, be surprised at finding those who are outside of the Church falling into error regarding the various subjects with which the scientist is supposed to deal. Conflicting errors and changing opinions are the inevitable resulting consequences of rejecting the Church's authority. The theories and the guesses, the materialism and the atheism, which go so far towards making up what is known as "modern science," are simply the natural outgrowth of the great apostacy of the sixteenth century.

The German "Reformers," with Luther at their head, rejected the Church and retained the Bible; the Deists of England cast away the Bible and held on to God: the Encyclopædiasts of France repudiated God and contracted their faith to a simple recognition of the existence of matter. Luther opposed Catholicity; Voltaire battled against Christianity; modern materialism has entered the lists against religion of any and every form. The pantheists of the last century insisted on it, that all men are Gods. The materialists of our own age are equally positive that we are all beasts. At one time, scientists, with Lelande, will refuse to believe in the existence of God, because they have never seen Him with their telescopes; at any other time they will join in a chorus of praise about "Father Mud, the Almighty Plastic." With Broussais, they deny that there is a soul, because, forsooth, they have never found it at the end of their scalpels; and, with La Mettrie, they teach that man is merely a plant or a machine. In one generation "everything," in the words of Bossuet, "is God except God Himself; and in another, men, who call themselves scientists, will write long treatises on nature, without even a mention of the name of the Deity, and without the slightest allusion to His power and wisdom as displayed in His works. With Hæckel, they will believe in spontaneous generation—although it has been proven to be absurd—rather than acknowledge the miracle of creation. In a word, "Every one of them," to quote the language of Voltaire, "destroys and renovates the earth after his own fashion, as Descartes framed it, for philosophers put themselves without

ceremony in the place of God and think they can create a universe with a word."

But our modern "advanced thinkers" have gone even farther. Not content with eliminating from their creed everything pertaining to theology, they have gone so far as to discard logic and philosophy. They sneer at the productions of the great masters of thought of ancient and mediæval times, and speak of their philosophic labors in terms of undisguised contempt.

Büchner, for instance, flippantly declares, that the metaphysics of the Platos, the Descarteses, the Malebranches, the Bossuets, the Fenelons, the Leibnitzes and the Clarkes, may beguile simple minds, but no one, like himself presumably, could seriously regard it as a science.

With Büchner, as with modern scientists generally, outside of the pale of the Church, everything is reduced to induction, and it is applied indiscriminately to the discussion of every question, whether of the natural or of the supernatural order. According to them, a man cannot consistently profess a belief in the truths of philosophy, as a science of principles, and at the same time be a scientist.

In his work on "Man in the Past, Present, and Future," Büchner quotes, as expressing his own sentiments and those of his school, the violent denunciations of the atheistic Dr. Page against all who have the hardihood to accept anything that, like the truths of philosophy or religion, presupposes fixedness and unchangeableness of belief.

"No man," says Dr. Page, "who has subscribed to creeds and formulæ, whether in theology or philosophy, can be an unbiased investigator of the truth or an unprejudiced judge of the opinions of others. His sworn preconceptions warp his discernment; adherence to his sect or party engenders intolerance to the honest convictions of other inquirers. Beliefs we may and must have, but a belief to be changed with new and advancing knowledge impedes no progress, while a creed subscribed to as ultimate truth and sworn to be defended, not only puts a bar to further research, but as a consequence throws the odium of distrust on all that may seem to oppose it. Even when such odium cannot deter, it annoys and irritates; hence the frequent unwillingness of men of science to come prominently forward with the avowal of their beliefs. It is time this delicacy were thrown aside, and such theologians plainly told that the skepticism and infidelity—if skepticism and infidelity there be—lies all on their own side. There is no skepticism so offensive as that which doubts the facts of honest and careful observations; no infidelity so gross as that which disbelives the deductions of competent and unbiased judgments."[1]

And "these words of gold," to which Büchner and his associates say amen, "deserve to be graven on brass and affixed to the doors of all churches, schools, and editorial rooms."

It would be indeed difficult to put in words more damning evi-

[1] Author's preface.

dence in support of the arraignment we have drawn up against modern scientists than the passages we have just quoted. Nothing could reveal more clearly their methods or declare more explicitly their desires and purposes. Passion and zeal in furtherance of an ungodly cause have led them to make known the animus that governs them in their researches, and to betray the secret of the subterfuges and tergiversations that characterize them, and of the pronounced hostility they display whenever there is question of the relation of science to the Church.

As to a Catholic scientist, it would be simply impossible for him to fall into the errors, contradictions and absurdities of those who have rejected the assistance and guidance of reason, and faith of philosophy and revelation. He would not idle away his time in futile speculations, which his faith, if not his reason, would tell him, have no foundation in fact. On the contrary, he would eschew all such sources of error, and be spared the mortification of the constant changes and retractions our modern materialistic scientists are constantly obliged to make.

In his admirable "Sept Leçons de Physique Générale," the immortal Cauchy, conceded to be the ablest mathematician of his age, makes a pointed reference to this subject. Speaking of the precautions that students of science should take to avoid falling into error, he says:

"One ought to reject without hesitation, every hypothesis which is in contradiction to revealed truth.[1] I will not say in the interest of religion, but in the interest of science, because truth can never contradict itself. It is, for having neglected this rule, that there have been scientists who have squandered in futile attempts much precious time that might have been happily employed in making useful discoveries. What important contributions might not have been made to our collection of scientific memoirs, if religion had always guided the pen of those authors, who for awhile imagined that they had discovered that the zodiacs of Denderah and Esne have an antiquity of twelve thousand years; that man is descended from a polyp; that he has existed on earth from all eternity; that the deluge is a fable; that the creation of man and animals was the effect of chance; that even in our own days, they can be seen springing from the earth in the isles of the great ocean; and that the natives of America form a different species from that to which we belong, etc.?" "Yes, gentlemen," the learned author continues, "we are forced to recognize the fact, that, as in regulating the heart of man and interdicting to him false pleasures, religion simply opens up to him a new source of ineffable joys and seeks his own happiness; so also, in imposing on the mind of the savant certain rules, she simply confines his imagination within just limits, and spares him the regret of having been misled by false systems and pernicious illusions."[2]

[1] The learned German scientist, Prof. Virchow, although not a Catholic, has wisdom enough to see the necessity of this rule laid down by the illustrious Cauchy. In his address before the German Naturalists at Munich in 1877, he solemnly declared that "Every attempt to transform our problems into dogmas, to introduce our conjectures as a basis of instruction, particularly any attempt simply to dispossess the Church and to supplant her dogma by a creed of descent—aye gentlemen—this attempt must fail, and in its ruin will entail the greatest peril on the position of science in general."

[2] *Sept Leçons de Physique Générale, deuxiene leçon.*

The lesson here inculcated is the one put in practice by every Catholic student of science. It is, indeed, one of the most striking characteristics of the many eminent men who have reflected honor on science and on the Church, that they have always known what are the true limits of science as distinguished from those of philosophy and theology, and that they have understood how to steer clear of the Scylla and Charybdis that have been the destruction of so many proud and venturesome spirits outside of the Church.

The distinguished French chemist M. Berthelot, in writing to M. Renan *apropos* of this subject, says:

"Positive science pursues neither first causes nor the end of things, but it proceeds by establishing facts and connecting them with each other by intimate relations. . . . The human mind ascertains the facts by observation and experience; it compares them and thence infers relations; that is to say, facts which are more general. These in turn, and this is the sole guarantee of their reality, are verified by observation and experience. It is the chain of these relations, extended further each day by the efforts of human intelligence, that constitutes positive science."

In referring to the same subject, the eminent physiologist Claude Bernard declares that:

"First causes are not within the domain of science, and that they always escape us, as well in the science of living bodies as in the science of brute matter."

The celebrated Pasteur says, in the same strain, that:

"Experimental science is essentially positivist, in this sense, that in its conceptions it never introduces the consideration of the essence of things, of the origin of the world, and of its destinies."

Were we to question the other great representatives of science, of present or past time, concerning the domain of the sciences in which they achieved such success, they would give us the same answer.[1] With Cauchy, Berthelot, Claude Bernard, Pasteur, they would tell us that science deals simply with facts and phenomena; that the methods and instruments of the scientist cannot be ap-

[1] It gives us pleasure to quote here from two of the most renowned, although two of the most neglected, scientists of the Middle Ages, viz., Roger Bacon and Albertus Magnus—the former a Franciscan monk, the latter a Dominican friar. To these eminent scholars and to Galileo, of a later age, and not to Lord Bacon, is due the introduction of the inductive or experimental method in the natural and physical sciences. Roger Bacon, in his *Opus Majus*, p. vi., 1, says: "Duo sunt modi cognoscendi, scilicet per argumentum et experientiam. Sine experientia nihil sufficienter sciri potest. Argumentum concludit sed non certificat, neque removet dubitationem ut quiescat animus in intuitu veritatis, nisi eam inveniat via experientiæ." Albertus Magnus, *Opp.*, tom. v., p. 340, writes: "Harum autem, quas ponemus, quasdam quidem ipsi nos experimento probavimus, quasdam autem referimus ex dictis eorum, quos comperimus non de facile aliqua dicere nisi probata per experimentum. Experimentum enim solum certificat de talibus, eo quod de tam particularibus syllogismus haberi non potest."

plied to questions that belong to an order that is supersensible or supernatural. Ever ready to acknowledge the assistance afforded by philosophy and revealed truth; to recognize the light they throw on the many complicated questions which arise in the study of nature, they yet always have before them the lines of demarcation separating the sciences based on induction from those that repose on the firmer and more certain bases of reason and faith.

It has been such men, working in accordance with the principles indicated, that have given to the world the precious deposit of science it now possesses, and it is one of the glories of the Church that she can point to all the great masters of true science as those who, if not in every instance within her pale, were trained in accordance with her teachings and were ever, directly or indirectly, under her influence. She has always counted, and still counts, among her children the most eminent representatives of every department of science. Wherever there is question of original, practical work as distinguished from distracting, fickle theorizing, her children are the first to respond to the call.

But, as a rule, this is a kind of work of which the world hears little or nothing. There is nothing sensational about it; nothing that, as a rule, will secure fame, much less notoriety, for those who engage in it. It has not about it that glamour of novelty, that fascination of presentation which so captivates the superficial multitude in the speculations of Darwin, Huxley, Tyndal, Haeckel and others of their school. It is, however, just such work as is accomplished by these quiet, unassuming laborers in the fields of science that is appropriated for the construction of the various new-fangled hypotheses of which we hear so much.

And here, indeed, lies the great distinction between the two classes of scientists of whom we have been speaking. Those who are directly or indirectly under the influence of the Church are eminently practical men—men of fact, of patient research, of rigid demonstration; men who will accept nothing as science that is not proven and will entertain nothing as scientifically possible that contravenes any of the acknowledged truths of philosophy or revelation. Those, however, who boast of being free-thinkers—who are intellectually the lineal descendents of the proud, independent, self-sufficient spirits of the apostacy of the sixteenth century—the agnostics, materialists and atheists, to whom we have referred during the course of this article, are men who instinctively prefer, whatever they may aver to the contrary, fancy to fact, hypothesis to demonstration, theory to positive science. They are, in a word, men who wish to have a world without a God, and they bend all their energies to devise plausible arguments to deceive themselves and those who, like themselves, are seeking for some pretext for

being deceived. Only on this assumption can we account for the amazing popularity of the anti-religious theories of certain modern scientists who, in reality, have nothing to offer except simple negation of all that is grand and noble in religion and philosophy.

"By their fruits ye shall know them." We may compare the representatives of the two schools—the Catholic and non-Catholic, the Christian and the anti-Christian—and we shall find that even in those departments of science in which the latter boast of having accomplished so much it is to the former that justice must decree the award for meritorious work. Instances that prove the truth of this assertion abound in every period of the history of science.

Among some of the many who are now distinguished, or who in recent years have been distinguished, for their eminence in science, and for their loyalty to Holy Church, may be mentioned Leverrier, Faye, and Fathers Secchi, Denza, Ferrari, and Perry, among astronomers; the brothers Tulasne, among botanists; Barrande, Dumont, d'Homalius, d'Halloy, and de Lapparent, among geologists; Barf, Dumas, Berthelot, and Chevreul, among chemists; Chasles, Pussieux, and Cauchy, among mathematicians; General Newton, and Count de Lesseps, among engineers; Schwann, Johannes Müller, St. George Mivart, Claude Bernard, Canon Carnoy, Van Beneden, de Quaterfages, and Pasteur, among zoölogists and comparative anatomists. These illustrious men, faithful sons of the Church, and deserving well of science, have simply kept the traditions of their eminent predecessors in similar departments of science.

And what has been said of those just enumerated can also be said of many distinguished Christian scientists who, nominally without the fold of the Church, have never strayed far away from her benign influence. Among the numbers who, during the last quarter of a century, have added lustre to science, and borne witness to the truth of Christian teaching, we may count the names of James Clerk Maxwell, Gabriel Stokes, P. G. Tait, Sir William Thompson, Asa Gray, J. D. Dana, Joseph Henry, Sir David Brewster, Dr. Whewell, Adam Sedgwick, Sir Roderick Murchison, E. Hitchcock, Sir John Herschell, and Michael Faraday. And should we wish to go back further, we should find such men as Sir Isaac Newton, Cuvier, Euler, Leibnitz, Linnæus, Kepler, Hugh Miller, Davy, Volta, Galvani, Ampere, Oerstedt, Pascal, Descartes, and a host of others, scarcely inferior to them in genius and the extent of their attainments, who were as staunch defenders of revealed truth as they were valiant champions of science.

The Church, then, does not impede the progress of science. Her influence has not been of that blighting sort that her enemies are so fond of ascribing to her. On the contrary, the names men-

tioned—and it were easy to increase the list—are sufficient evidence of the falsity of the charge. Her standing in the scientific world to-day, represented, as she is, by the most brilliant minds in every department of human thought; her past history in reference to the development of science; and the fostering care which she has always bestowed upon those who devoted themselves to the study of nature, are an irrefragable argument for the validity of the position she has ever assumed, and still maintains, respecting the relations of the science of nature to reason and revelation.

We have already seen what has been the outcome, in their bearing on science, of the principles adopted and promulgated by the so-called reformers of the sixteenth century. The principles of Luther and Calvin and Zuinglius and Bucer have been carried out to their logical consequences by their followers, and we have to-day, as their representatives and lineal descendants in Germany, the Hæckels, the Voghts, the Büchners, the Strauses, the Schmidts, the Schopenhauers, and their legions of co-laborers and sympathizers. In France, the teachings of the Reformation are to be seen in the works of such authors as Renan, Madame Royer, and Paul Bert; and in England in the productions of Spencer, Darwin, Huxley, and Tyndall.

Yet, notwithstanding all the evidence to the contrary, a certain class of writers still indulge in the fancy of referring to the Reformation as the one great event in the world's history that liberated mankind from the intellectual thraldom with which it had so long been oppressed by the Church of Rome. Science, they tell us, was then given free scope, something it never had in the past, and men of science rejoiced in a liberty that they had long sighed for, but had never known before. We have seen what are now the fruits of this liberty—a liberty that means materialism of the rankest kind, and atheism of the most pronounced character.

But was science given the free scope about which there has been so much boasting? Were men of science encouraged, and did the Reformation contribute to the advancement of science? This is a question of history, and to history we appeal for an answer.

We may quote, as authority, one who has always shown himself specially inimical to the Church, and whose testimony, therefore, cannot be called in question by his fellow anti-Catholics. We refer to J. W. Draper. In his "History of the Conflict between Science and Religion,"—a conflict, by the way, that has never existed, so far as the Church is concerned—the author in speaking of the effect of the Reformation on scientific development, says:

"Luther declared that the study of Aristotle is wholly useless; his vilification of the Greek philosopher knew no bounds. 'He is,' says Luther, 'truly a devil, a horrid calumniator, a wicked sycophant, a prince of darkness, a real Apollyon, a beast,

a most horrid impostor on mankind, one in whom there is scarcely any philosophy, a public and professed liar, a goat, a complete epicure, this twice execrable Aristotle.' The schoolmen were, as Luther said, 'locusts, caterpillars, frogs, lice.' He entertained an abhorrence of them. These opinions, though not so emphatically expressed, were entertained by Calvin. *So far as science is concerned, nothing is owed to the Reformation.*" [1]

When Luther comes to speak of universities and schools, his language is nothing short of the ravings of demoniac frenzy. Any one who will take the trouble to consult any of the earlier editions of his complete works—the later editions are more or less expurgated—can verify for himself the accuracy of this statement.

"Universities," according to Luther, "are dens of robbers, temples of Moloch, synagogues of perdition. All high schools," said he, "should be razed to the ground. Nothing more infernal or more diabolical, has ever come, or ever will come, upon the earth." He regarded them as the works of the devil, and said "that, during the reign of the popes, the devil spread his nets to catch the souls of men, by the erection of schools and convents."

But let us come to facts and figures bearing on the influence of the preaching of Luther and his coadjutors on the study and progress of science.

The dean of the philosophical faculty of the University of Erfurt, in an official report for the year 1523, says that

"No one, living before our day, would have believed it, if it had been foretold to him that, in a short time, our universities would have fallen so low—as they have fallen—that there would scarcely remain a shadow of their former glory. The subject of the University is so treated in the pulpits of the Reformers, that there is scarcely anything connected with it which, erstwhile, was held in estimation, that is not now condemned." [2]

From year to year, after the introduction of the Reformation, the number of teachers and students at Erfurt rapidly decreased. More than this, it soon became difficult to find proper persons who cared to accept a position in any capacity either in this or other universities or schools.

The number of students matriculated at Erfurt from 1520 to 1521 was 311. In the following year, the number sank to 120; in 1522 it fell to 72, and in the year 1523–4 there remained only 34.

The fate of Wittenberg was the same as that of Erfurt. Melancthon, the least vandalic of the Reformers, and the one who displayed the greatest love of learning, does not hesitate in his confidential correspondence to attribute the decline of science and

[1] Page 215.

[2] For the quotations here made, see the admirable *Geschichte des Deutschen Volkes zeit dem Ausgang des Mittelalters*, von Johannes Janssen, Band 2, p. 294, *et seq.*

the contempt in which studies of all kinds were held, to the Reformed theologians. He declares "that the age has become an age of iron, that the sciences are neglected and despised," and that he despairs of any revival in their behalf.

The universities of Northern Germany, as Leipzig and Rostock, fared no better. In Rostock which, before the Reformation, counted full 300 students, the number in 1524 had dwindled down to 38, and in the year following the roll-call was responded to by only 15.

The same sad picture was presented in South Germany and Switzerland, and notably at Heidelberg, Friburg and Basle. "The University seems dead and buried," was the wail that went out from Basle in 1524. "The rostrums of professors and the benches of students are empty." In the year 1522 it could count only 29 students, and in the year 1526 the number enrolled was 5.

Heidelberg, in 1525, numbered more professors than students. "I have now only six students, and these are French." Thus wrote from Freiburg, in 1523, the most celebrated professor of jurisprudence of his age, Ulrich Zasius.

Under the Emperor Maximilian I. the University of Vienna had attained to the rank of one of the most celebrated institutions of learning in Europe. It then counted its professors by the hundred, and frequently had a yearly attendance of 7000 students. But this happy condition of things was soon to undergo a melancholy change. In consequence of the religious disturbances, and social disorder induced by the Reformation, matters shortly came to such a pass that the attendance was reduced to scarcely a dozen, and the lecture-halls of the law-faculty had to be closed for want of students.

What has been said of the universities mentioned, may, to a greater or less extent, be said of all the educational institutions, where the Reformation was able to gain a foothold. It had the same blighting effect in Holland as it had in Germany and Switzerland. The decline of science and letters followed its entrance into Scandinavia, and a protracted period of scientific drought was consequent on its introduction into England and Scotland.

"There is," said Erasmus, "a dearth of letters, wherever Lutheranism reigns." This sect dissuaded students from taking degrees and endeavored by every means in its power to divert the attention of youth from the pursuit of science and the higher branches of knowledge. "Booksellers," observes the same writer, "declare that they could more easily sell three thousand books before the introduction of the new gospel, than they could dispose of six hundred after it."

"Under the pretext of the Gospel," writes in the year 1521 the

humanist, Cobanus Hessus, "the reformers here suppress entirely the liberal arts. By their pernicious teaching they snatch from the nobler studies all the regard which is due them, in order that they may palm off on the world their ravings as so much wisdom. Our school is deserted; we are held in contempt."

"So deep are we sunken," complained the noted scholar, Camerarius to a friend, "that there is left to us only a memory of our former good fortune; the hope of ever enjoying it again, is entirely dissipated."

"To what an issue have the sciences come?" wrote Nossen, another contemporary of the Reformers. "No one witnesses without tears, how all ardor for science and virtue has disappeared." And thus continued this calamitous state of affairs during the long and troublous years that witnessed, in the countries named, the dissemination of the baneful doctrines of the "New Gospel." Had it not been for the latent spirit of the Church, which, in spite of the ban under which it was placed, still continued to exert an influence for good, and which, finally, enabled the better nature of those who had so long lain in a state of thralldom to reassert itself, a great portion of what had been Christian Europe, would have reverted to barbarism and paganism. The Reformation—contrary to what is so often proclaimed—did not mean progress; it meant regress; and regress was prevented by that very body, and by it alone, against which the Reformers fought so vigorously and persistently, the Church of Rome.

With truth, then, does the illustrious German writer, Dr. Hettinger declare that "It is a fact that Protestantism checked the development of science for centuries." And any one who wishes to acquaint himself with the evidence bearing on the case need not go far in search of it. The erudite and conscientious Janssen, in his great work on the "History of the German People," and the learned Dr. Döllinger in his exhaustive work on "The Reformation," not to mention other eminent authors, will supply the searcher after truth with all the data and witnesses he may need to form a just estimate of the Reformers, their doings and their influence on scientific progress. No one, it may safely be asserted, who carefully, and with an unprejudiced mind, reads the works just mentioned, can come to any other conclusion than that reached by the well-known Apologist, Dr. Hettenger, in the words just quoted, viz., that it is a fact which cannot be gainsaid, that the Reformation retarded the development of science, and retarded it, not for a few years only, nor for a few generations, but, "for centuries."

But the Reformation impeded the progress of sciences in more ways than one. Not only were its principles inimical to science,

not only did the Reformers discountenance and discourage the study of nature, as being something that was antagonistic to faith and piety, but, in their blind fanaticism, they went so far as to make those who devoted themselves to scientific pursuits the objects of obloquy and persecution. This may sound strange to those who have been wont to believe that liberty—moral and intellectual—was what was claimed and what was gained for our race by the Reformation. There are, however, no facts in history better authenticated than are those instances of intolerance and persecution, persistent and systematic, by the Reformers and their descendants, of men of science, on account of their researches and discoveries. It is a fact that does not admit of question that the spirit of the Reformation, not only in its incipient stage, but in every subsequent period of its history, including our own time, is a spirit of persecution, not only in matters religious, social and political, but equally so in matters intellectual and scientific.

Hallam in his "Constitutional History of England" declares that "Persecution is the deadly original sin of the Reformed Churches, that which cools every honest man's zeal for their cause in proportion as his reading becomes more extensive." This statement, however, is mild in comparison with the opinion of the historian, Lecky. He does not hesitate to say that

> "Persecution among the early Protestants was a distinct and definite doctrine, digested into elaborate treatises, indissolubly connected with a large portion of the received theology, developed by the most enlightened and far-seeing theologians, and enforced against the most inoffensive as against the most formidable sects. It was the doctrine of the palmiest days of Protestantism. It was taught by those who are justly esteemed the greatest of its leaders. It was manifested most clearly in those classes which were most deeply imbued with its domestic teaching."[1]

"When," says Draper, in the work quoted, the "Royal Society of London was founded [Protestant], theological odium was directed against it with so much rancor that, doubtless, it would have been extinguished, had not King Charles II. given it his open and avowed support."[2]

What a striking contrast between the circumstances attending the foundation of this society and those connected with the incorporation of similar scientific societies in Catholic countries like France and Italy! In these latter countries several societies that have deserved well of science were founded long before the Royal Society of London was thought of, and the first to encourage and protect, if not to join these societies, were eminent dignitaries of the Church.

The first president of the French Academy of Sciences was a

[1] *Rationalism in Europe*, vol. ii., p. 61. [2] P. 307.

Catholic priest, the celebrated astronomer, Jean Picard. Subsequently, the *Journal des Savants* was founded by another priest, Jean Paul Bignon, who was also the president of the Academy. During the course of the eighteenth century the presidential chair of this learned body was filled by no less than twenty-six ecclesiastics, and its most learned and most active correspondents, not only in Europe but in other parts of the world, were churchmen.

When the calendar, now in use in all civilized nations, was promulgated by Gregory XIII, in 1582, it met with the most violent opposition on the part of the Protestant nations of Europe. It was not introduced into England until 1752, when the Royal Society took the matter in hand, and induced Parliament to pass a law prescribing the new calendar. But the members of the Society who were chiefly instrumental in effecting the change found that they had raised a storm about them which it would be difficult to quell. Some of "The Fellows," says Draper, "were pursued through the streets by an ignorant and infuriated mob who believed it"—the Society—" had robbed them of eleven days of their lives; it was found necessary to conceal the name of Father Walmesley, a learned Jesuit; and, Bradley happening to die during the commotion, it was declared that he had suffered a judgment from heaven for his crime."[1] The people of England preferred, it has been said, to be at war with the heavens to being at peace with the Pope,—the only one capable, to borrow an idea from the learned Jesuit, Petavius, of propping up the falling year, of giving it completeness and security, and, what the ancients had no idea of, endowing it with perpetuity and constancy.

In Germany, the Gregorian calendar was not wholly adopted until 1774. The Protestant theologians of Tübingen strongly opposed it, and declared that its acceptance would be tantamount to an encouragement of impiety and Popery.

"We hold the Pope," said they, "to be a horrible, roaring lion. If we take his calendar, we must needs go into the Church when he rings us in." "Shall we, then," they continued, "have communion with Antichrist? What is there in common with Christ and Belial? If he succeed, under cover of imperial authority, in forcing his calendar upon us, he will soon lead us by the nose, and it will be impossible for us to defend ourselves from his tyranny in the Church of God. Thus will he lord it over us, and do with us as he pleases. Besides, of what good is the new calendar? There is not a second deluge to fear; and summer will not come either sooner or later; and even if the time of the equinoxes should be slightly changed, there will be no husbandman dolt enough to send reapers into the fields at Pentecost, or vintagers into the vineyards on the feast of St. James. The whole thing is simply a pretext of those in league with the Pope. This Satan has been expelled from the Christian Church, and we do not wish to have him steal in again."[2]

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[1] *Op. cit.*, p. 308.

[2] *Les Savants Illustres* du XVI. et du XVII. siècle, par C. A. Valson, Paris—Vie de Kepler, p. 104.

But the opposition to the calendar was not confined to the ignorant populace, or to antagonistic theologians. Even those whose scientific attainments rendered evident to them the truth of the new method of reckoning, allowed themselves to be carried away by their prejudices. "With them," in the words of Hallam, "truth was no truth when promulgated by the Pope," and they long obstinately refused to receive from the Court of Rome a truth which, according to the saying of Voltaire, "they would have accepted from the Grand Turk, if he had proposed it."

In Russia, for reasons similar to those recited in the case of Germany, the Gregorian calendar has never been introduced. That country still retains the old calendar of Julius Cæsar, and "prefers to disagree with nature rather than be in accord with the ruler of the Church of Rome."

Let us, however, come more specifically to the persecution of individuals. The enemies of the Church had, until recently, been fond of bringing up the case of Galileo, as a "martyr of science," but, in the light of recent research on this subject, they have been forced to drop the case as being without foundation in fact. The truth is, that all the martyrs of science, and there have been many, have met their persecutors, and their executioners, outside of the Church. All the Galileos that authentic history tells us of, all those who have suffered for the cause of science, were those, and those only, who were brought before the tribunal of the Reformation, or who were persecuted at the instigation of men who were the upholders of principles which the Reformation endorsed and promulgated.

We have a striking instance in the case of the great astronomer Kepler. He was banished from his home by the Reformed theologians of Tübingen, who heartily hated him because he had the courage of his convictions and because he dared to speak in favor of the Copernican theory and the Gregorian calendar, against which his co-religionists so vigorously and so fanatically protested. Not only was he banished, but, during his whole life, he was made an object of persecution on the part of the Reformed theologians of Germany. The only ones that recognized his transcendent genius and the only ones that assisted him in the hour of need, the only ones that he could call his friends and who always proved themselves such—and this in spite of his religious opinions—were the Jesuits and the Catholic rulers of Catholic Austria, the country in which, after his banishment from his native land, he spent the greater portion of his life. Among those who specially befriended Kepler were Father Christopher Schreiner, S. J., a learned mathematician and astronomer, who claims with Galileo the honor of having discovered the spots on the sun, and Father Cysatus,

S. J., who took charge of printing, at Ingolstadt, the first works of the immortal discoverer of the three grand laws of planetary movement.[1]

A portion of Kepler's life was spent in Prague, where he worked in conjunction with Tycho Brahe, the illustrious Danish astronomer. Tycho Brahe, like Kepler, is another "martyr of science," and, like Kepler, was driven from his own country and found friends and patrons only among those whom certain writers would have us believe must have been his greatest enemies—the Catholic rulers and ecclesiastics of his time. The distinguished Dane had erected in the land of his birth what was undoubtedly the most complete observatory of the time. He had spent full two hundred thousand dollars—an immense fortune at that time—on buildings and instruments, and by their means had enriched astronomy with the most extensive and accurate observations until then known, and which, of themselves, would have placed Tycho among the greatest of astronomers. It was by means of these same observations that Kepler was able to make his brilliant discoveries and that the way was paved for the brilliant achievements of Newton and others, scarcely less renowned. But, notwithstanding Tycho's many titles to honor and reward, he was forced by Christian IV.—the leader of the Protestant armies in the Thirty Years' war—and his underlings to leave his beautiful Uraniburg, the name he had given to his observatory; and this was in consequence of the report of the government commission which declared "that the studies of Tycho were of no value, and that they were not only useless, but noxious."[2]

But, not content with driving the great astronomer from the scene of his priceless labors, his ruthless enemies would not rest until they had razed the magnificent observatory of Uraniburg to the ground and had destroyed all the instruments that Tycho had been unable to take with him when he left the country. So complete was the work of destruction that a traveller, visiting the site of the observatory not long after, sums up what he saw in one sentence: "There is in the island"—the island of Huen, between Denmark and Sweden—"a field where Uraniburg was."

Kepler and Tycho Brahe, however, were not exceptional victims of persecution and fanaticism. Their renowned contemporary, the greatest genius of his age and one of the greatest geniuses of any age, and a devout Catholic, Réné Descartes, was another conspicuous object against which were directed the envenomed shafts of ignorance and intolerance. "When Descartes," we again quote

[1] Vie de Kepler, *op cit.*, p. 111.

[2] See *Martyrs of Science*, by Sir David Brewster, p. 157, and Vie de Tycho Brahe, par C. A. Valson.

from Leckey, "went to Holland the Reformed clergy directed against him all the force of their animosity, and by the accusation of atheism they endeavored to stir up the civil power against the author of the most sublime of all modern proofs of the existence of the Deity."[1]

But we have an instance of more systematic persecution, a case in which even history, as far as might be, has contributed to detract from, or, rather, remain silent regarding, the merits of one of the most gifted, and original, and successful investigators that England has ever produced. We refer to the second Marquis of Worcester, the inventor of the steam-engine. Savery and Newcomen, and notably James Watt, are usually spoken of as the inventors of the steam-engine, but if there is one chapter in history which, more than another, needs to be rewritten, it is the one which refers to the steam-engine and its inventor. To any one who has made a thorough and unbiased examination of the subject, he can have no doubt that Watt, and Newcomen, and Savery have long worn the laurels that have all along belonged to the Marquis of Worcester. It is a simple matter of record that the Marquis of Worcester invented a practical, working steam-engine; that he had it in operation in London for years, and that he had received a patent for it from Parliament over a hundred years before Watt was granted his first patent.

The Marquis was fully aware of the value of his invention, as he tells us in the only work of his that has been spared to us, his "Century of Inventions," and made for years every possible effort to bring his "semi-omnipotent engine," as he loved to call it, to the notice of his countrymen. But his efforts were unavailing. Learned travellers from France and Italy, among others the Grand Duke of Tuscany, Cosmo de Medici, called to see his engine and workshop, and had only words of praise and admiration for what they saw. But the learned men of England were unable or unwilling to show any appreciation of the most important mechanical contrivance of the greatest inventive genius of his own or of any age. The members of the Royal Society talked of the engine of the noble Marquis only that they might sneer at it. Dr. Robert Hooke, one of its members, went to see it only in order that he might—we use his own words—"laugh at it." "As far as I was able to see it," he writes, "it seemed one of the perpetual motion fallacies."

The secretaries and historians of the Royal Society make no mention of an invention with which, it is certain, they were acquainted, for it had been discussed in public meetings of this body.

[1] *Rationalism in Europe*, vol. ii., p. 50.

On the contrary, a studied silence is observed whenever there is question of the noble Marquis and his marvellous invention; a silence, which—barring a few depreciatory notices given at intervals by odd writers—continued until the publication, a few years ago, by Henry Dircks, Esq., of his masterly work on "The Life, Times and Scientific Labors of the Second Marquis of Worcester." In this masterpiece of industry and patient research, the learned author clears up the mystery that has so long enveloped the life of the illustrious inventor, and shows why he was treated with such indifference during life, and why so little had been said of him since his death. He shows us how, "in scientific acquirements," the Marquis of Worcester "stood grandly alone," and tells us how he proved himself "one of the most extraordinary mechanical geniuses of the seventeenth, or any preceding century." But, notwithstanding all this,

> "He was neither understood nor appreciated in his own day, ... while the influence of combined prejudice and ignorance served further to obstruct his rising in public estimation. The Marquis besides was a hundred years in advance of his time. He lived in an 'age which burned and drowned so-called witches, which believed in the transmutation of base metals into gold, put faith in the curative effect of sympathetic powders, and the king's touch for bodily distempers, saw portents in meteoric phenomena, and considered astrology as sound science.' Books and pamphlets were constantly being published filled with mysticism, gravely recording day-dreams of fanatics and impostors, and letters lent their aid to promulgate such fables; yet here was a new agent at work—the steam engine of the Marquis, of such potent power that its like had never been seen, which, nevertheless, men saw, heard and listened to in dumb astonishment, with the infantile simplicity of the poor Indian, ignorant of the value of gold or diamonds strewn in his path."[1]

But, what, at bottom, was the cause of the unparalleled persecution of which the noble Marquis was so long made the object? Ignorance, jealousy, prejudice do not afford an explanation of the ridicule heaped on the great inventor during life, and the studied silence that has been guarded concerning him and his work for upwards of two centuries. The light of true history, which has at length been thrown upon the life of this remarkable man, explains what would otherwise remain an inexplicable paradox.

The Marquis of Worcester belonged to a hated and a proscribed people. He was a Roman Catholic.

In the brief notice of the Marquis in his "History of England," Lord Macaulay, speaking of the work of the great inventor says, with no less point than truth, "But the Marquis was suspected to be a madman, and known to be a Papist. His inventions, therefore, found no favorable reception."[2]

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[1] *The Life, Times and Scientific Labors of the Second Marquis of Worcester, to Which is Added a Reprint of his Century of Inventions, 1663, With a Commentary Thereon.* By Henry Dircks, Esq. London: Bernard Quaritch, 1865. P. 339.

[2] *History of England*, vol. i., p. 408.

The cynical and supercilious Walpole, in his "Catalogue of Royal and Noble Authors," in referring to the Marquis of Worcester, displayed his ignorance and bigotry by flippantly observing, "But, perhaps, too much has been said on so fantastic a man; no wonder he believed in transubstantiation, when he believed that he himself could work impossibilities."[1]

Did we not have the evidence before us, we could not believe that ignorance, prejudice, bigotry, injustice could go to such lengths. But the facts in this case are undeniable, and the treatment the Marquis of Worcester received at the hands of his countrymen on account of his religious convictions, will ever remain a standing monument to the folly and persecution of a nation that has always been so loud in professions of liberty and enlightenment.

But, it may be said that the case of the Marquis of Worcester is exceptional in England, and that it should not be insisted on so strongly. We could wish that it were so; but history tells us differently. It tells us that the vaunted liberty, promised by the Reformers and their followers, was only a delusion and a snare, and that it has never had any existence in fact, either in England or anywhere else. A few more instances, bearing on this subject,—numberless cases of similar import might be cited,—must suffice to prove to the most skeptical the truth of the position here assumed.

"In 1772," says a Protestant writer, in speaking of the attitude of "Protestant England" towards men of science, "sailed the famous expedition for scientific discovery, under Cook. The greatest, by far, of all the scientific authorities chosen to accompany it, was Dr. Priestly. Sir Joseph Banks had especially invited him; but the clergy of Oxford and Cambridge intervened. Priestly was considered unsound in his views of the Trinity; it was expected that this would vitiate his astronomical observations; he was rejected, and the expedition crippled."[2]

He also quotes for us authorities who tell us how, in Scotland, at the beginning of this century, the use of fanning-mills for winnowing grain was denounced as contrary to the text: "The wind bloweth where it listeth," and "As leaguing with Satan, who is prince of the powers of the air, and as sufficient cause for excommunication from the Scotch Church."

In referring to the opposition which geologists met with in their investigations, the same writer, reiterating what Sir Charles Lyell had so forcibly stated before him, declares, "that, of all countries, England furnished the most bitter opponents to geology at first, and the most active negotiators in patching up a truce on a basis of sham science afterward."

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[1] Quoted by Dircks in his introduction to *The Century of Inventions*, p. 349.

[2] *The Warfare of Science*, by A. D. White, p. 69.

English churchmen felt called upon to denounce geology as "a dark art," as something which "was not a subject of lawful inquiry," as something that was positively "dangerous and disreputable." And those who devoted themselves to geological research, were regarded as "invading a forbidden province," "as attacking the truth of God," and as "impugners of the Sacred Record." How different the attitude of these men from that of our illustrious Cardinal Wiseman in reference to the subject in question. "The conduct of this pillar of the Roman Catholic Church," says the Protestant writer whom we have been quoting, "contrasts nobly with that of timid Protestants, who were filling England with shrieks and denunciations."

But it is in the science of medicine that we find the most striking instances of ignorance, prejudice and persecution. The lives of Harvey, Jenner, Simpson and other distinguished masters of medical science, show what opposition they had to encounter even when conferring upon poor afflicted humanity the greatest boons in the giving of the healing art. The illustrious Harvey had his house torn down over his head, had his papers and books destroyed, and was so harassed on all sides, that, after making known his discovery of the circulation of the blood, he had not the courage to do further original work.

Those who discovered and introduced inoculation, vaccination and anæsthesia, were made the victims of similar assaults. And those who were the most violent denunciators of these noble benefactors of our race, were precisely those who had set themselves up as teachers of men, and who were, in their time, regarded as the representatives of the Established Church of England. From the pulpit of Canterbury—the seat of the primacy—and that of Cambridge—the stronghold of English science—and from numerous other pulpits also, anathemas without number were hurled against Jenner and Simpson and their co-laborers. They were charged with practices contrary to the law of God, and of introducing methods for preventing or counteracting disease, that were characterized as "diabolical operations," and as attempts to bid "defiance to heaven itself."

The same opposition in Protestant countries was manifested to that wonderful tonic and febrifuge—that most remarkable of specifics—quinine. This valuable drug is one of the constituents of the bark of the Cinchona tree, indigenous to the slopes of the Bolivian and Peruvian Andes. It was first introduced into Europe by the Jesuit missionaries, and, from this circumstance, was long known as Jesuits' bark. In the Catholic countries of Europe,—in Spain, Portugal, France, Italy, especially—the great remedy was received with joy and thanksgiving. But Germany and England

would have naught to do with it. It was looked upon as a dangerous Papal device; as some lethal woorara more potent than the poison of the fabled upas tree, with which the crafty Jesuits and their abettors designed to execute fierce vengeance on their enemies. In England—to such an extent had distrust and fear taken possession of the public mind,—quinine was not accepted as a remedial agent until after the distinguished physician, Sir Roger Talbot, had introduced it under a fictitious name, and had proved its efficacy by numerous and striking cures.

A similar violent opposition was manifested both in England and in our own country against the use of Franklin's wonderful invention—the lightning-rod. It was gravely asserted by the Protestant religious doctors of the day that the lightning-rod disturbed the equilibrium of the elements; and, when in 1775, a severe shock of earthquake was felt, it was at once credited to the diabolical invention of the American philosopher. A Boston preacher even went so far in 1770 as to denounce lightning-rods as "impious contrivances to prevent the execution of the wrath of heaven."

And all this was during the time that several eminent ecclesiastics, in France, Spain, and Italy, were making special efforts by their writings and experiments to make known the merits of Franklin's remarkable invention, and have it brought into general use. The famous Abbé Nollet lectured on the subject in Paris; the Abbé Mazeas made experiments connected with the same matter at the Chateau de Maintenon, while their compatriot, the learned Father Paulians, distinguished himself both by writings and inventions in the field of electricity. During this time the Abbé Toaldo and other ecclesiastics, in Austria and elsewhere, were at work showing the practical application of Franklin's invention, and urging its adoption.[1]

As a matter of fact, the first lightning-rods used in Austria were put up under the direction of Abbé Toaldo. What has been said of the ecclesiastics just mentioned, may be reiterated regarding Fathers Bartear and Berand, the Abbés Berthelon and Poncelet, and others of their confrères in religion, whose investigations and experiments contributed not a little towards the dissemination and development of knowledge concerning the then mysterious phenomena of atmospheric electricity.

But why multiply examples? It were easy to adduce other instances similar to those given, but it is unnecessary. Those just referred to are abundantly sufficient to substantiate all that has

[1] See *Histoire de la Physique*, par Ferdinand Hoeffer, chap. iv., and *Contestacion a la Historia del Conflicto entre la Religion y la Ciencia*, de Juan Guillermo Draper, por el P. Fr. Tomas Camara, Valladolid, 1880, cap. xi., sec. ii.

been said regarding the illiberal and intolerant principles that have ever characterized the Reformers and their successors, and show, alas! too clearly, that the spirit of persecution which Luther and his colleagues let loose nearly four centuries ago is still dominant, wherever it is in a position to exercise its power.

The same spirit that moved Calvin to burn Servetus at the stake, impelled the brutal mob to guillotine the illustrious chemist Lavoisier, and provoked the infamous Dumas—then president of the revolutionary tribunal—to declare that "the republic has no need of chemists." It was the same spirit, too, that persecuted Harvey, that destroyed his property, and forced him to desist from making many contemplated contributions to science.

And Harvey must have noticed the contrast that impresses itself so forcibly on ourselves, although such distant spectators of occurrences that so closely concerned him. In Italy, almost under the shadow of the Vatican, he quietly, under the direction of his distinguished master, Fabricius of Aquapendente, pursued those researches that have made him famous, and there under the eye of the Popes he met with that appreciation, and received that encouragement, that was denied him in his own country, until it was forced by very shame to recognize his ability, and give him the credit which was so richly his due. But Harvey's case is not an exceptional one.

While the Reformers of Germany under Luther, of Switzerland under Calvin, of Scotland under John Knox, of England under Henry VIII., were carrying on their work of destruction, and burning at the stake all those who dared to differ from them, the sons of Holy Church, headed by learned Religious of various Orders—the Jesuits, the Franciscans, the Dominicans, the Benedictines, and others, were carrying on the work of scientific research and discovery in the various departments of science, in every part of the Old and of the New World. They occupied, not only the foremost places in the lecture halls and laboratories and observatories of Europe, but were equally distinguished in the Orient, and in the newly discovered lands of America. Not only as zealous evangelists, but as scientists, they were to be found in the palace of Peking, instructing the learned men of the Celestial Empire in the science of astronomy, while awaiting an opportunity to impart to them a knowledge of the Gospel of Peace. And, whilst traversing the plains of Tartary and the steppes of Siberia, and feeling their way through the jungles of India, they ever showed themselves as much devoted students of nature as they were always zealous ministers of the Word. And so, too, was it when pushing forward through the snows of Canada, or wending their way through the forests or over the prairies of what is now known as the United

States. And the same was it, likewise, when they conducted those marvellous explorations that have made them famous the world over, when they were carrying on the work of discovery connected with our great lakes and rivers; when they were making surveys of the abysmal cañons of our boundless West; when they were reconnoitering the table-lands of Mexico, and the pampas of South America; when they were penetrating the dark defiles and climbing the steep declivities of the Andes and the Cordilleras; when they were carrying the banner of the Cross to the isles of the Pacific, and bearing it in triumph to the heart of the "Dark Continent." Everywhere they were recognized, not only as the messengers of the good tidings of the Gospel, but as reverent and industrious investigators of the wonderful works of God; of works which they were the first of civilized men to behold, and the first to make known to the learned of the Old World. It was thus that, until comparatively recent times, the knowledge that was possessed of the flora and fauna, of the languages and races of men, of the topography and civilization of the world, was obtained through those who are so often characterized as being indifferent to, if not opposed to, the advancement of natural knowledge.

There is scarcely a museum in Europe that is not more or less indebted to these same indefatigable missionaries for some of its most precious collections. The archives of the various academies and learned societies, filled as they are with their communications, memoires and *relaciones* on almost every branch of human knowledge, testify in the most conclusive manner to their tireless activity and to their intelligent and well-directed methods of research.

And what these studious and accomplished missioners did for the museums and learned societies of Europe they did for its botanical gardens, and for agriculture and horticulture. It is simply a matter of botanical history that the most useful vegetable products, now so extensively used for food, medicine and as articles of luxury, and the most prized plants and herbs, now the ornaments of our gardens and conservatories, were brought to the knowledge of the people of the Old World by the priests and monks, who were sent to evangelize the peoples of the distant lands of America, Asia, Africa and Polynesia.

The poet-priest Martin del Barco was the first to describe the flora of Paraguay and the first to bring to the notice of Europeans the beautiful Passion Flower, a plant that has since been introduced into every part of the civilized world. A knowledge of the Cochineal cactus and the insect found on it, of Tolu balm, of the Agave plant and other wonders of vegetation is due to Father F. Lopez de Gomara.[1]

[1] *Histoire de la Botanique*, par Ferdinand Hœffer, Paris, livre iii.

But it is unnecessary to go into details. Were we to do so it would be tantamount to giving whole chapters of the history of botanical science. It may, however, be said, in this connection, that not a little of the reputation of the English botanist, Ray, rests on his description of floral collections sent by Catholic missionaries from America. But the one who was best able to appreciate the value of the contributions made by these missionaries to the science of botany was the very one who was ever ready to acknowledge the debt that was due them. He was no other than the illustrious botanist, Carl von Linnæus.

In order that we may more fully realize how much has been done by ecclesiastics, not in any one department only, but in every branch of knowledge, we may take as an illustration the manifold contributions, on every subject, they have made regarding the history, products, language, antiquities and people of Mexico. To such an extent are modern investigators indebted to ecclesiastics respecting what is known of the past history of this interesting country, that it would be scarcely too much to say that if we were to eliminate what they have done there would be little more for the historian to consult than myths and the fictions of his own imagination.

Father Antonio de Solis, the distinguished Spanish historiographer, gives us the first readable and reliable history of Mexico as it was at the time of the conquest. Las Casas, a Dominican, offers us a more detailed account of the country and its inhabitants as they were seen by Cortez and his gallant band. Clavigero, a Jesuit, spent thirty-six years in collecting and collating materials for his great work, the "Storia Antica del Messico." He mingled with the people, inquired into their traditions, studied their languages, examined their monuments, manuscripts and paintings, and carried his arduous undertaking to a more successful issue than any one who had preceded or who has succeeded him in the same fertile field of inquiry. Of the learned French archæologist, Abbé Brasseur de Bourbourg, scarcely less can be said than what has been declared of Clavigero. His works on Mexico, especially on Yucatan, are more voluminous, and more thorough, and have thrown more light on many disputed points of Mexican history than any similar productions of modern times. Indeed, one can say without any fear of being contradicted, that had it not been for the writings and researches of the illustrious authors just mentioned, and others of their brethren, Prescott would never have thought of his "Conquest of Mexico" and Humboldt would never have attempted his masterly "Vues de Cordilleres" or his "Essai Politique sur le Royaume de la Nouvelle Espagne." Both of these distinguished writers are constantly obliged to refer to the authori-

ties just mentioned—except Brasseur de Bourbourg, who comes long after them—and Humboldt, particularly, is frequently forced to admit the accuracy of their accounts and to bear testimony to their indispensableness in the preparation of his own works.

Let these instances suffice. It were easy to adduce many others of similar purport. But the ones given may serve as types of the others, and will confirm what has been so strongly insisted on during the course of this article, viz., the eminently practical character of the work accomplished in the various departments of science by the sons of Holy Church, and by those, who, although outside of her pale, have always been, more or less, under her influence, and who owe to her inspiration, most, if not all, of the success they have achieved in the study of nature.

The examples cited will also show how much of the science usually ascribed to certain lauded professors and much over-rated naturalists, men who should be known rather for their professions of irreligion than for their scientific achievements, is in reality due to those quiet, persevering, successful workers, whose names scarcely ever reach the public ear, but who, in every instance, are the ones, and the only ones, who have laid the foundations, broad and deep, of the beautiful structure of science. Your modern scientific theorizers who are so much talked about, your scores of scientific speculators, to whom an ignorant public still attributes all the advance made in the natural and physical sciences, are simply so many parasites that live on the labors and the discoveries of others; men, who appropriating the observations of the thousands of reverent minds who in their study of nature never fail to see nature's God, work these same observations into the warp and woof of their fantastic and godless theories; men who spend their lives in day-dreams, and in imagining, no less than the benighted multitude that renders them homage, that their useless hypotheses are, and must be, accepted as so much veritable science.

The illustrious Catholic chemist, J. B. Dumas, in speaking of this subject, pertinently observes that

> "People who only exploit the discoveries of others, and who never make any themselves, greatly exaggerate their importance, because they have never run against the mysteries of religion which have checked real savants. Hence their irreligion and their infatuation. It it quite different with people who have made discoveries themselves. They know, by experience, how limited their field is, and they find themselves at every step arrested by the incomprehensible. Hence their religion and their modesty. Faith and respect for mysteries is easy for them. The more progress they make in science, the more they are confounded by the Infinite."

The history of all genuine science demonstrates the truth of these observations. Every Catholic, every Christian, scientist is a living example of their accuracy. All the great scientists of the

world have been, are, and ever must be, men of faith, men of religious instincts, men who have felt on them the spell of Christian teaching.

"Unless," says Cardinal Manning, "men of science, the Atomists and the Dynamists ascend to the Creator and see Him in all atoms, and forces, and points, as the sole intelligible reason of the Cosmos, they speak but half-truths, which the reason rejects as inadequate."

It is, then, a mistake to suppose, as is popularly imagined, that the eminent scientists of the world, it matters not to what age they may have belonged, have been men without faith, without religion. On the the contrary, they have all been God-fearing, God-serving men.

The famous mathematician, Euler, was always conspicious for the love and veneration which he ever cherished for the Sacred Scriptures.

"The day is near at hand," writes Kepler, "when one will know the truth in the book of nature as in the Holy Scriptures, and when one will rejoice in the harmony of both revelations."

Sir Isaac Newton, whose modesty was equaled only by the magnitude of his discoveries, was so impressed with his own littleness in the contemplation of the wonderful works of God, that he declared, a short time before his death: "I seem to have been only like a boy playing on the seashore, and diverting myself in, now and then, finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me.[1]

"The true chemist," observes the illustrious Sir Humphrey Davy, "sees God in all the manifold forms of the external world."

The great Linnæus exclaimed, in a spirit of rapture: "I have traced God's footprints in the works of His creation, and in all of them, even in the least, and in those that border on nothingness, what power, what wisdom, what ineffable perfection!"

"As astronomy," declares the distinguished savant, J. Mædler, "comes from heaven, so does she show herself worthy of such an origin. She claims on her side a knowledge of God, while she unfolds truths that make us acquainted with His great works, and unfolds laws, which bear the name of laws of nature, and with right, not because nature has given laws to herself, but because God has written them out for her."

And to the witnesses just quoted, may be added the testimony of one who has most deeply penetrated the many mysteries that

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[1] *The Life of Sir Isaac Newton*, by David Brewster, New York, Harper, 1831, p. 301.

ever present themselves to the student of nature, and who, by a life of profound study and fruitful research, was specially prepared to appreciate the utter worthlessness of the numerous theories that are sprung upon the world in the name of philosophy and science. We would refer to the eminent physicist and mathematician, the late James Clerk Maxwell. "I have," he observes, "looked into most philosophical systems, and I have seen none that will work without a God."

No, it is not true,—let us repeat it,—it is not true, that the great scientists of the world have been atheists, or men of irreligious bias. Their writings and their lives prove the contrary. They have been Catholics, or men who have ever been under the benign and inspiring influence of Catholic teaching. From Leonardo da Vinci, and Copernicus, and Galileo, and Pascal and Descartes, all devoted Catholics, to Volta, Ampere and Galvani, their co-religionists, and down to Father Secchi, Barrande, Chevreul, Van Baneden and Pasteur, of the same glorious household of the faith, the torch-bearers of science have always been as distinguished for the ardor of their religious convictions as they have been eminent for their attainments in the various branches of natural knowledge.

No; atheists have not been, intellectually, great men, or they would have been able to accomplish more than they have accomplished and to have wielded a greater influence than they have wielded. Atheism is sterile, and always has been; and rejecting, as it does, the Author of nature, it is inevitable that it should be sterile. It is only when atheists go counter to their professions, that they are able to effect anything of importance, or of lasting value. And then the results they attain are reached, not in consequence of their professed atheism, but in spite of it.

They achieve success, in virtue of having followed, unconsciously and unintentionally, it may be, the methods of Christian teaching and of Christian philosophy. All that is done in opposition to this teaching and this philosophy is false, changeable, ephemeral.

Where, now, are the proud unbelievers of the last century, who fondly imagined that, by their science, they had demolished the Church, and had proven the fatuity of her doctrines? Swallowed up in oblivion; "unwept, unhonored and unsung." The same fate awaits the boasting unbelievers, the proud, would-be scientists of our own day. A just retribution will, in a few short years, expose the shallow pretensions of the Hæckels, the Vogts, the Büchners, the Strauses, the Berts, the Moleschotts, the Huxleys, Darwins and Tyndalls, who are now making so much noise, and creating such a stir among their credulous worshippers. Yes; in a few short decades hence, their names will scarcely be remembered

and their cherished theories, to which so much importance is now attached, will, like the vain imaginings of their unbelieving and materialistic predecessors, give way to speculations and systems that may then, for a time, commend themselves to the folly of those who say in their hearts, "there is no God."

But, with all these changes of theory and system, the works of Christian savants will remain,—ever extending the domain of mind over matter,—always adding to the magnificent treasure of human knowledge, and contributing to the well-being and happiness of mankind.

A few words now as a *rêsumê* of what we have gone over and we conclude.

We have seen how intimately the inductive sciences are connected with philosophy and revelation, and how a successful cultivation of the former depends on the light and assistance afforded by the latter. We have seen, too, how the Catholic Church is the only institution on earth which can render to scientists groping after truth the aid and intellectual illumination that alone can prevent them from lapsing into error. We have noted how those who are popularly reputed as the representatives of modern science have given themselves up to the pursuit of *ignes fatui*, and have allowed themselves to be carried away by vagaries of every character conceivable. We have found that this straying away from the truth, this wandering after phantoms, is the inevitable consequence of their anti-Catholic attitude, of their materialistic and atheistic creeds, of the principles promulgated and propagated by the so-called reformers of the sixteenth century. We have examined these principles and the doctrines inculcated, and found them illiberal, intolerant, and radically opposed to scientific progress. We have considered instances of bigotry and persecution in matters of science that would seem incredible were they not perfectly attested by the seal of authentic history. We have observed how eminently practical Christian scientists have ever been, and how, thanks to their faith, and the principles of a sound philosophy, they have been able, whilst reconnoitering the vast expanse of nature, to avoid the quicksands of error, and attain to the veiled sanctuary of science and truth. We have learned that the great savants of the world, are, and have ever been, men of the most ardent faith and of the loftiest religious sentiment. They have been men, who, like the illustrious Barrande, tell us of what they "have seen,"[1] and not of what they have imagined; men who have made themselves useful by enlarging the sphere of positive knowl-

[1] Joachim Barrande, the ablest Palæozoic naturalist of his age, puts the words "*C'est ce que j'ai vu*," at the head of all his writings. See an interesting account of his life and scientific labors in the *Revue des Questions Scientifiques*, Julliet, 1884.

edge; men who have steered clear of the fogs of unbelief and the rocks of materialism, which have been the destruction of many who might otherwise have deserved well of science and of their race.

"Science is the handmaid of religion," and the two are united by bonds that may not be severed. Religion can dispense with science, but science cannot progress without religion; cannot ignore revelation. Only under the fostering care of the religion of our fathers; only under the patronage of the Catholic Church, therefore, can science find that stimulus, or experience that energizing influence that favors the development of which she is capable, and which alone can prepare her for those glorious triumphs for which she is destined.

A SAD CHAPTER FROM THE STORY OF IRELAND.

DO many of the readers of the CATHOLIC QUARTERLY allow themselves occasionally the pleasure and distraction of a good novel? To such we may recommend Walter Besant's "For Faith and Freedom"; very much for its own intrinsic merits, but more for another reason they will afterwards understand.

Many may be surprised to hear it is an historical novel. For, Mr. Besant has earned his loudest fame in another very different field, as the delineator of the sad condition of the working and lower classes in London, and the author of some successful schemes for improving and brightening their lives. Philanthropists are rather popular people just now,—admiration for them has become quite a fashion,—consequently, Mr. Besant and his social novels have captured an unusual amount of the world's attention. But, probably, he does not forget that fashions change perpetually in this fickle world, and in his historical novels we imagine he is building himself a monument of more enduring fame. "All Sorts and Conditions of Men" has served its purpose and most effectually; when social conditions change a little, or when a new fashion in philanthrophy is invented, its interest and its fame can hardly survive. "For Faith and Freedom" speaks, not to one age, or for one order alone; its interest and charm are universal, and will be lasting.

The story is intended to show the causes which prompted and