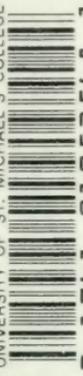
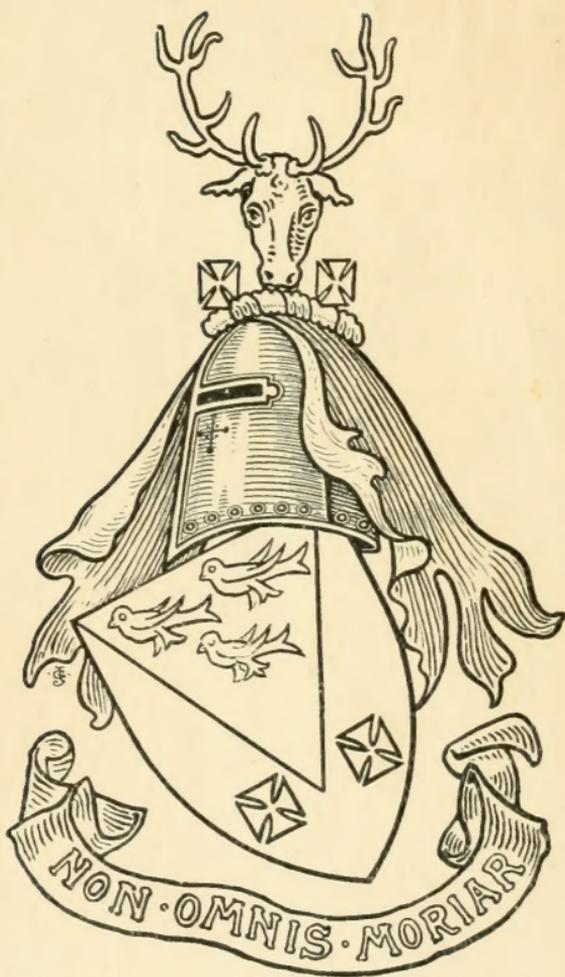


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# AGNOSTICISM †

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BY THE REV. JOHN GERARD, S.J.

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WE are all familiar with the term "Agnosticism," and recognize the attitude of mind which it denotes as the most formidable antagonist of Christianity at the present day. It must therefore seriously claim the attention of all who would not only preserve the treasure of their own souls unimpaired, but likewise render assistance to the multitude of their fellows, within and without the Church, who, as one of these latter not long ago expressed it to me, are suffering from the sickness of bewildered faith.

But, frequently as the term is employed, it is very doubtful whether the great majority of those who use it to describe even their own position, attribute to it its proper and legitimate sense, and accordingly in order to discuss the question, it behoves us first to make sure what it is that we are talking about.

There can, I think, be little doubt that very many of those who style themselves "Agnostics" signify that they are atheists, that they deny the existence of God, believing it to have been disproved by the discoveries of modern science, which, in the words of M. Caro, conducts God with honour to its frontiers, thanking Him for His provisional services, which it finds no longer required. This creed is often called "Agnosticism," but it is not that to which the title should be applied.

The genuine agnostic, as his creed is described by such authorities as Professor Huxley, who gave it its name, and Sir Leslie Stephen, indulges in no dogmatic denials, which

† A Paper read at the Catholic Conference, Brighton, Sept. 25, 1906.

he holds to be as irrational as dogmatic assertions. He will not say that there is no God, that man has not an immortal soul, that there is no eternal future in store for him of weal or woe, according to the manner of his life. What our agnostic does maintain is that in regard of all such matters we can *know* nothing, and that it is therefore mere idle waste of time and trouble to concern ourselves about them. His principle is that we can obtain true knowledge only by means of sensible experience, that is to say, only by means of such observations and experiments as fall within the province of science; and since such a mode of research can obviously teach us nothing about the beliefs and hopes of religion, he concludes that we know nothing, nor ever can know, or even conceive the possibility of knowing, anything concerning these.<sup>1</sup> Accordingly, Professor Huxley lays it down that to occupy ourselves with such matters is as futile a proceeding as to inquire what are the politics of the inhabitants of the moon.<sup>2</sup>

It is thus clear that very different meanings are attached to the term "Agnosticism," while it is no less obvious that they are equally destructive of Christianity, and even of religion in any intelligible sense of the word. If we can know nothing of the existence of God and our relations towards Him, He is non-existent, so far as we are concerned, as is a rainbow for the blind; and as reasonable men we shall be forced to adopt Professor Huxley's advice, and dismiss entirely from our mind all such inquiries, by means of which we can no more accomplish anything than a squirrel can travel back to his native wood by revolving in his cage.

It is to the consideration of agnosticism in its proper or genuine sense that I shall confine my observations; not only because this appears to be the only legitimate mode of treating the subject, but, even more, because in this guise it is undoubtedly most dangerous. That science has discovered anything which disproves the fundamental ideas of religion, is an assertion that cannot seriously be made,

<sup>1</sup> Professor Ray Lankester, in the *Times*, May 19, 1903.

<sup>2</sup> *Lay Sermons* ("The Physical Basis of Life").

and in consequence, as Sir Leslie Stephen allows,<sup>1</sup> Dogmatic Atheism is, to say the least, a rare phase of opinion.—rare we should add amongst real students, though sadly too common amongst the less educated masses, who pin their faith to the confident but unscientific teaching of such writers as Professor Haeckel.

Genuine agnosticism, on the other hand, bases itself upon a principle which undoubtedly contains truth, and as we all know, a half-truth is the most dangerous of errors. The human intellect, it rightly declares, is limited. There are boundaries which it is wholly unable to overstep, and it is our duty as honest men frankly to recognize our limitations, and not to dream dreams as to what there is beyond the frontier at which we are forced to stop, and then to persuade ourselves and others that these dreams are realities.

So far, it is evident, the agnostic is right. No doubt our intellect is limited,—very limited. No doubt also it is our duty to confess as much, and not to pretend to knowledge which we do not, and cannot, possess. We part company with him when he goes on to make the assumption, already noticed, that in one way only can we arrive at a knowledge of truth, namely by the empirical method of observation and experiment. Whatever transcends the narrow limits of experience, and is thus “metempirical,” says Sir Leslie Stephen, is forbidden ground for the intellect, which is there deprived of the very breath of its life, and becomes as impotent as our lungs, or the wings of a bird, would be beyond the confines of the atmosphere. But, necessarily, theology, in any sense, professes to exist in this impossible sphere, and therefore, in his view, it is plainly an imposture. Not only, he continues, are we incapable of knowing all about God, or of fully comprehending His nature and attributes, but we cannot know *anything* about Him, not even that He exists, for His existence cannot be demonstrated by observation and experiment.

Such is the position which the agnostic maintains as being the only reasonable one, and we repeat that not only

<sup>1</sup> *An Inquiry into Agnosticism*.

is it altogether unreasonable, but that if we adopt it we must renounce all knowledge, not only concerning God and the truths of religion, but of much else of which no man doubts, and even concerning the truths of science herself.

For it is a patent fact that in no single branch of inquiry can the mind stop where observation and experiment cease to be available; and, were it to stop there, it would inevitably deprive what observation and experiment have taught it of all possible significance. Take, for example, the province of Physics. This deals with two factors, Matter and Force. What do we know, scientifically, about them? Of Matter, which we can observe, and on which we can experiment, we know a little, a very little, and every fresh discovery does but make it more obvious how little this is. But Force! As to what it is, science knows just nothing at all. We see its results, or at least phenomena which we are forced to ascribe to its action, on the principle that every effect must have a cause. But the nature of that cause is absolutely dark, for we cannot get at it to observe or try our experiments. We know, for instance, that stones dropped from the hand fall to earth, and we say that this is due to the attraction of gravitation. In reality we *know* no more, from mere observation, apart from inference, than that these stones behave as if there were such an attraction; and when we try to pass further, and imagine what this attraction may be, we speedily discover so many perplexities that Sir John Herschel called it the "mystery of mysteries." As a well-known man of science has lately put the matter<sup>1</sup> :—

"Physics knows nothing of Force as an efficient cause of the accelerations with which it deals. The planets are in motion round the sun; the molecules of crystals move in an orderly fashion. What makes either planet or molecule move we simply do not know, as men of science. Under assignable conditions, they do move, and there's an end on't—for science."

But because she is thus utterly ignorant of the nature of Force, which lies beyond the limits of observation and

<sup>1</sup> Principal Lloyd Morgan in the *Tribune*, February 10, 1906.

experiment, does science declare her inability to be certain even of its existence? To do so would be to stultify herself and reduce all her domain to hopeless chaos. She could not predict, as do our almanack-makers, the course of the earth and the other planets during the coming year, did she not unhesitatingly assume that gravitation, however incomprehensible to her, will continue to act and to hold these bodies in their several paths round the sun; for were this to cease, they would fly off into space. Similarly, multifiform as are the uses to which we have learnt to put electricity, no man has the faintest idea what electricity is; and, in the words of the writer I have just quoted, "Biology knows nothing of vital force as an efficient cause of the phenomenon with which it deals."

There are other instances in which science is powerless, not only to pass beyond phenomena to that, which through itself imperceptible, is implied by them, but even, by any method of her own, to verify the phenomena themselves. Such is the case when they are phenomena, not of matter, but of mind. This is manifest in regard of æsthetic. What test can science apply to distinguish between the poetic excellence of the "Iliad" or "Hamlet," and that of the rhymesters who supply our music-halls; or between a picture by Turner and the sign of a public-house? Yet have we any doubt whatever that there is all the difference in the world? We are more certain of this than that the earth goes round the sun.

Still more imperiously does this truth force itself upon us in regard of the moral law. Whatever may be their systems and professions all men are forced practically to agree that some things are good and others bad; some lines of conduct right and others wrong; and that no power on earth can change their character, so as to make benevolence, generosity, and truthfulness evil, and exalt cruelty, selfishness, and fraud in their place. As Mr. Balfour says:

"The two subjects on which professors of every school, theological and anti-theological, seem least anxious to differ, are the general substance of the Moral Law, and the character of the sentiments with which it should be regarded.

<sup>1</sup> *Foundations of Belief* (Eighth Edition), p. 13.

That it is worthy of all reverence ; that it demands our ungrudging submission ; and that we owe it not merely obedience, but love—these are commonplaces which the preachers of all schools vie with each other in proclaiming.”

Here, then, is something in regard of which by the common consent of mankind, we have arrived at certitude, towards which science can by no possibility contribute anything. She can no more discriminate between good and evil than between beauty and ugliness, nor can she offer any explanation as to why it should be man's duty to reverse the conduct of what many, professing to speak in her name, represent to us as our evolutionary ancestors. It is not science but conscience that witnesses to the law, and conscience is nowise “scientific,” for it refuses to argue, and appeals only to its own evidence in issuing its peremptory prohibitions or commands. Nevertheless, the most typical agnostics have no hesitation in accepting with fullest assent what comes to them in this non-scientific or “metempirical” manner. Professor Huxley, for example, tells us that<sup>1</sup>—

“ We live in a world which is full of misery and ignorance, and the plain duty of each and all of us is to try and make the little corner he can influence somewhat less miserable and somewhat less ignorant than it was before he entered it.” But how is any such duty made “plain” to us? Most assuredly, not by any method of scientific observation and experiment. Agnostic science tells us that man has been evolved through the survival of the fittest, in the struggle for existence, and that the quality which enabled his progenitors to survive, was their utter disregard for others, whom they ruthlessly stamped out whenever they stood in their own way. Whence came the total change of principle when man appeared upon the scene?—for how great is the change some of the ultra-partizans of the new school demonstrate by rushing into extravagance in the opposite direction, and declaring that our duty is to forget ourselves altogether, and think only of the good of others. Nay, it has even been maintained, not only that the claims of patriotism must vanish, as tinged with selfishness, giving

<sup>1</sup> Hume, *English Men of Letters*, p. 58.

place to world-citizenship, but that should we in the future establish relations with the inhabitants of other planets, "Our altruism must widen its embrace beyond the limits of the human family."<sup>1</sup> It is quite evident that, however constantly they may have the name of science on their lips, it is not through her that men arrive at such conclusions.

We may obviously go further, and ask how the fundamental principle of agnosticism itself can be warranted by science. That principle, as we have already heard it, is that only by means of observation and experiment can any real knowledge be acquired.

But how can observation and experiment establish such a principle? How can positive means of acquiring knowledge establish the negative conclusion that no other means of acquiring knowledge are possible? To say this would be like saying that the sense of touch can avail, not only to demonstrate the reality of objects within its reach, but moreover to prove the non-reality of those which we cannot feel but only see. How can observation and experiment demonstrate anything either for or against the pretensions of other means for obtaining knowledge, which they are, confessedly, as powerless to examine as are our most sensitive nerves to verify the existence of the luminiferous ether?

Thus, in laying down his first principle of argumentation, the agnostic contradicts it, by accepting it as true, in the very same breath in which he declares that he can have no sufficient warrant of its truth.

Here in fact we encounter another example of the fatal defect which attaches to any purely negative system. As every tyro in logic has learnt, the man who declares that we can be sure of nothing, refutes his own assertion by being sure that we cannot be sure; he who asserts that no man can ever tell the truth, necessarily would have it understood that he himself is telling the truth in making such a statement. In like manner, our agnostics declare their fundamental principle to be certain, although—on their own showing—we can have no grounds whatever for accepting it. They desire to exclude sources of knowledge,

<sup>1</sup> Saleeby, *The Cycle of Life according to Modern Science*, p. 3.

the elimination of which would at once introduce intellectual vacuum, and make it impossible for us to know more of the universe or of ourselves than do the beasts of the field, which have senses as good as ours, or better, but have not mind. And so impossible is the position thus created that the agnostic never thinks of applying his own principles save in the one instance of religion, and it is, indeed, abundantly evident that they were never seriously meant to be applied to anything else.

Can it be said, therefore, that as concerns religion the agnostic principle assumes a different character, and can claim a validity which it obviously lacks in other fields of knowledge? This is, no doubt, the assumption at the back of the agnostic mind, an assumption which in effect prejudices the whole question. But how can it be said that the processes of reasoning upon which believers rely are alien in their nature from those which are recognized as sound and legitimate in other branches of inquiry? As we have seen, in physics we accept the existence and efficiency of forces altogether inscrutable to us, because of phenomena which we cannot attempt to explain without assuming their existence. In æsthetics and ethics we ground all our philosophy upon phenomena which are utterly beyond the reach of observation and experiment, but to which we nevertheless assent with absolute certitude.

In exactly the same manner does the Natural Theologian argue from Nature to Nature's God. As it has been excellently expressed by a recent writer<sup>1</sup> :—

“Taking the three factors of the universe—matter, force, and mind—we find this state of things. The ‘philosophers’ see as much as they want to see, and no more. These three mysterious entities lie equally behind the veil, are equally ‘metaphysical conceptions.’ Natural phenomena bear witness to the existence of all three in exactly the same way, viz., by special characteristics from which we necessarily *infer* the existence of each. From the reality of these phenomena, we infer a real basis, *matter* ; from their actual occurrence, we infer an agent or power at work, *force* ; from their orderly character we infer a controlling

<sup>1</sup> Gaynor, *The New Materialism*, p. 14.

and guiding influence, *mind*. Why are two of these inferences valid, although they point to things 'behind the veil,' and the third is to be regarded as invalid *because* it too points to something behind the veil? If we are able to read the existence of two of these things in their effects, why not of the third as well? The evidence is as plain in one case as another."

It is not easy to understand how such a line of argument can be condemned as unscientific and illegitimate, unless we are prepared similarly to treat those which science herself constantly employs. Nor does the fact of harmonious order, so strikingly evident in nature, stand alone as furnishing the basis of inference. To many minds the phenomena of the moral law will appeal even more forcibly. As we have seen, there is undeniably a practically universal consensus amongst mankind that what we style virtues are good, and what we style vices are evil: that it is our duty to practise the one and eschew the other; that it is no human enactment that has invested them with their respective characters, or imposed obligations in respect of them, and that no human power, no decree of kings or parliaments, could alter that character, or dispense from that obligation. Here is a phenomenon which like other phenomena postulates a cause, and despite the mists of words with which some philosophies would endeavour to bridge the gulf, but one intelligible explanation has ever been discovered, namely, that of theism. According to this, it is the Eternal, Self-existent, First Cause—God,—who, making man to His own image and likeness, implanted in his soul that conscience which is, as has been said, the monitor from whose judgement there is no appeal, and whose office it is to convey to us the will of our Creator.

Such are in brief some of the lines of argument by which we are led to the conclusions to which, as the *Caricature* declares, no process of reasoning can possibly lead us. I do not cite them for the purpose of directly denouncing the great question with which they deal, but only as enabling to judge of their character, and that of the agnostic ascertainment which seeks to put them out of court, and to deny the possibility of arriving at the knowledge of truth by them.

means. And I would ask all sensible men whether in this reasoning we do not follow the very method according to which science herself teaches us to argue.

One more observation before I conclude what I have to say regarding this aspect of my subject. The question we have in hand is one that requires to be treated by logic, not by quoting the authority of names, however great; but of authority something requires to be said, for nothing probably does so much to make agnosticism popular, as the idea, sedulously fostered by many of its exponents, that all scientific men are necessarily its votaries. But this is a most monstrous and groundless assumption, as a very slight examination is sufficient to show. Whereas agnosticism, as Sir Leslie Stephen tells us, declares any knowledge regarding God to be absolutely impossible for us, such eminent men of science as Professors Stewart and Tait tell us,<sup>1</sup> on the contrary, that the existence of a Deity who is the Creator and upholder of all things is for them "absolutely self-evident." Lord Kelvin not long ago<sup>2</sup> declared that "science positively affirms creative and directive power, which she compels us to accept as an article of belief." In the same manner thirty-two years earlier, he had told the British Association in his presidential address,<sup>3</sup> that "overpowering proofs of intelligence and benevolent design lie around us: showing to us through nature the influence of a free will, and teaching us that all living beings depend upon one ever-acting Creator and Ruler." So, another president, Sir William Siemens, told the same body<sup>4</sup> that "all knowledge must lead up to one great result, that of an intelligent recognition of the Creator through His works." It would be easy to multiply similar testimonies, but I will content myself with naming some of those who might furnish them—Sir John Herschel, Faraday, Clerk Maxwell, Sir Gabriel Stokes, Pasteur. And the greatest of them all, Sir Isaac Newton, undoubtedly recognized the limitations of our intelligence. He likened his own unparalleled discoveries, to the shells picked up by a child on the sea beach, while the ocean rolled before him

<sup>1</sup> *The Unseen Universe*, p. 47.

<sup>2</sup> See the *Times*, May 2, 1903.

<sup>3</sup> Edinburgh, 1871.

<sup>4</sup> 1884.

unexplored. But this recognition did not hinder him from holding that to treat of God is a necessary part of Natural Philosophy.<sup>1</sup>

There are, therefore, those who, while well acquainted with science and scientific method, know nothing of the agnosticism which is claimed as the result of such acquaintance.

Thus far, we have met the agnostic system on its own ground, and examined its root-principle in the light of pure reason. But, necessary though it be for us to be ready thus to deal with the attacks of our adversaries, and reply to their arguments, it is not by such means that a practical antidote to the malady of doubt and disbelief is to be obtained. The man who enjoys security against them is one who relies upon something far more efficacious than logic and argument to sustain his faith, namely, on the knowledge of God, which comes of his own personal experience in the practice of religion. The Catholic who says his prayers, who frequents the sacraments, who strives to live in communion with God, has means of knowledge concerning Him, of which the unbelieving philosopher can have not the faintest conception.

Natural theology, the knowledge of God which we can acquire philosophically by the light of Nature alone, is no doubt indispensable, as laying the foundations for something more, but it is not this which has in fact been appointed as the means whereby we are to arrive at the possession of truth; nor are its teachings adequate for the requirements of our souls as they actually are. Obviously, it can teach us nothing about Christianity, of which pure reason can know nothing. What it can tell regarding God of necessity falls far short of what He wishes us to know. Of necessity, the elementary notions which human reason naturally attaches to the idea of a Supreme Being, are the simplest of the Divine attributes—power, wisdom, and goodness, which it therefore sets forth as if they were all, and amongst them, as Cardinal Newman says, it has most

<sup>1</sup> *Principia*, Schol. Gen.

<sup>2</sup> *Christianity and Physical Science* (Lectures on Unsettled Subjects).

to say concerning power, and least concerning goodness. Even conscience, "our great internal teacher of religion, which, more than any other natural source of knowledge, teaches us not only that God is, but what He is, providing for the mind a real image of Him, as a medium of worship,"<sup>1</sup> represents Him primarily, and before all else, as our Judge, and the attribute on which its witness is so clear as even to blind us to all others, is His retributive justice. But this is not the aspect under which He desires His people to regard Him : and, as we know from our own experience and that of others, it is not in this character that He most powerfully appeals to the hearts of men, and secures their allegiance and service. It is not His will to leave us to the light of our unaided reason. From the first beginnings of our race He has ever superadded revelation, which He has placed within the reach of all, not of the learned and wise alone, but of the humblest and rudest, provided they were men of good will. And this is a point of prime importance : for if there be a God to know whom is the supreme necessity for men, and if He desires to be known by them—in other words, if there be true religion at all—then the obtaining of such knowledge cannot possibly be dependent upon the possession of faculties and powers of intellect which not one man in ten thousand possesses.

This being so, it is evidently a fatal mistake so to occupy ourselves with the arguments furnished by reason solely, as to make it seem, and perhaps ourselves to fancy, that in them alone is the justification of our faith to be found, losing sight, or allowing others to lose sight, of what is the real strength of our position. It is not by arguments, however cogent, that men are converted or that their hearts are touched, and we shall never arrive at anything satisfactory regarding religion if we discuss it like a point of law or a maxim of political economy.

"I do not want" (says Newman), "to be converted by a smart syllogism ; if I am asked to convert others by it, I say plainly I do not care to overcome their reason without

<sup>1</sup> *Grammar of Assent*, p. 385.

touching their hearts; I wish to deal, not with controversialists, but with inquirers."<sup>1</sup>

And inquirers are just what our agnostic friends are not. They will not even consider the possibility of Christianity being anything but fable and delusion, and so long as they remain in this state of mind we can have no hope of doing anything, but answering their arguments, as I have endeavoured to do, and demonstrating that we are not afraid to meet them on their own terms and look them squarely in the face.

Nor does it by any means follow, as will of course be objected, that because we will not restrict ourselves to the teachings of pure reason, we therefore disparage it and prove ourselves irrational and unscientific. Far from it. It is our reason, and especially, as has been said, the arguments it draws from the facts of conscience, that lead us to the recognition of God, and convince us that being, as He must be, supremely good, He has undoubtedly provided some means whereby we may obtain that knowledge concerning Him, an ineradicable craving for which He has implanted in our souls,—some way to Him accessible to all—"so plain that the wayfarers, though fools, shall not err therein." We look round the world and we find that the Catholic Church, and she alone, claims and ever has claimed to furnish these means, and that in her teaching millions of men in every age have found peace of soul, feeling that they had obtained what they wanted. By such marks our reason recognizes her as a creation which no mere human power can explain. As Newman writes:<sup>2</sup>—

"The great Note of an ever-enduring *vetus fidelium*, with a fixed organization, a unity of jurisdiction, a political greatness, a continuity of existence in all places and times, a suitableness to all classes, ranks, and callings, an ever-energizing life, an untiring, ever-evolving history, is her evidence that she is the creation of God, and the representative and home of Christianity."

Thus being convinced that here we have found the divinely-appointed teacher, our common sense bids us

<sup>1</sup> *Grammar of Atonement*, p. 410.

<sup>2</sup> *Essays Critical and Historical*, vol. i. on Essay IV.

submit ourselves to the Church, as otherwise she would have no reason for existing.

When we do so, and know her from within, we at once become cognizant of much which to those outside her is as imperceptible as the forms and hues of a painted window are to those without the building in which it is placed. Just as a child brought up on the system of Plato's *Republic* in a State institution, knowing nothing of father, mother, brother, or sister, could have no notion of the charms of home, or family ties, so those who have not been privileged to enter the household of Faith, can have no conception of the overpowering sense of security and peace which her faithful children enjoy, and in which they find the most convincing assurance that God is there, while the unerring instinct with which she divines and provides for all the wants and needs of humanity, "is in itself a proof that [she] is really the supply of them."<sup>1</sup>

Here, as I have said, is the real strength of our position, the true foundation of our Faith, if we build aright. No man will ever believe that he can know nothing of God, who has felt Him working within his soul, and has learnt to recognize His voice whispering comfort, encouragement, or reproof.

In arguing upon such grounds, we of course expose ourselves to the obvious objection that the evidence to which we appeal is notoriously subject, more than any other, to hallucination and delusion, for does not every fanatic and visionary rely confidently upon the testimony of his own inner consciousness?

This is undoubtedly true: but it proves no more than that here as elsewhere some men may fall into error—it certainly does not prove that none can find the truth any more than the undoubted fact that many have false taste in art proves that there is none which is true. Certainly, from the undeniable fact of the frequency of such errors, we cannot in reason draw the conclusion that such direct action of the Creator on the soul of His creature is impossible, or impossible to recognize with certainty, and

<sup>1</sup> *Grammar of Assent*, p. 481.

unless we can do this we must apply in each instance the tests which common sense suggests.

And here, as is evident, the sceptic or agnostic can contribute nothing towards a solution, for avowedly he has no experience of what can be judged by experience alone. The believer is in a totally different position. The universal craving of mankind to know something of their Maker and their destiny—or, in other words, their yearning for religion—is a fact which, as even agnostic philosophers admit, cannot be without significance. As the migratory instinct of salmon or swallow is inexplicable unless we understand its goal, the ocean, or the sunny south, so this restless longing of the human soul to obtain enlightenment concerning the deep problems of the universe, points to some means by which such longings can be satisfied. And when we find a religion by which as a matter of fact they can be satisfied, and satisfied in such a manner as to accord with the teachings of reason, however far they transcend these teachings, and exactly to harmonize with the voice of conscience, we have what we may even style a scientific argument in favour of that religion.

And here we discover the special and exclusive strength of the position of the Catholic. He does not stand alone, or rely merely upon his own private and personal discernment. He has with him the Communion of the Saints, the millions who for two thousand years, in every region of the earth, in every race and every class of society, have found peace for their souls where he finds it, and recognized the workings of the same spirit which he recognizes. It is this which alone has made the history of the Church possible, which has made her what even those who are not her children acknowledge her to be, the most marvellous kangery the world has ever seen, and it makes a strong demand upon our credulity to ask us to believe that envy, dishonesty and self-deception have been able to accomplish results which neither philosophy nor science could ever hope to emulate.

Over and above all this, there is the supernatural virtue of Faith, which, as every Catholic child learns from the Catechism, enables us to believe without doubtfully what—

God has revealed, and which invests the knowledge thus imparted with a character of absolute certainty, marking it off as something quite different from any other. Like other virtues, this may be forfeited by neglect and disobedience, as it can be fomented and cherished by fidelity and submission. As I have already said, he is truly secured against the perils we have been considering who can rely for his defence, not only, or even so much, on the weapons of his intellect, as on those aids which are given to those whose hearts are open to God's visitations, which they strive to merit by humble and faithful service. For such as these there is no danger lest, intoxicated with the pride of human knowledge, they should forget that there is knowledge still higher, and immeasurably more needful for man, towards which they will find that every kind of knowledge rightly understood does but point the way. As the illustrious Pasteur said, with whose words we may fitly conclude:—

“The result of all my studies has been to bring me to have the faith of the Breton peasant. Had I pushed them further I should probably have even the faith of the Breton peasant's wife.”<sup>1</sup>

<sup>1</sup> F. Bournand, *Pasteur, sa Vie et ses Œuvres*, p. 262

# MODERN SCIENCE AND ANCIENT FAITH.\*

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BY THE REV. JOHN GERARD, S.J.  
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**T**HERE can be no doubt that many minds are sorely distressed by what is termed the conflict between Science and Faith. Beyond all else, this is pre-eminently the age of scientific discovery : of this characteristic we are proud, and most justly proud. Never before have men pried so far into the secrets of nature ; never has the human mind exhibited itself so triumphantly as the most marvellous of all the forces within the range of our experience, by forcing all others to yield up their secrets and reveal their operations, or even to perform those operations at man's bidding and for the fulfilment of his purposes. And when with each advance of knowledge it is strenuously proclaimed by a

\* A paper read at the Catholic Conference at Hanley, September 30, 1896.

host of writers, that one more death-blow has been dealt not only to Christianity but to all belief in the supernatural, and that unless we choose to shut our eyes against the light now streaming in upon us, we must be content to recognize ourselves but as creatures of a day, called into being by blind natural forces and inevitably destined to sink again into the abyss whence we have come, "melting like streaks of morning mist into the infinite azure of the past"—that there is no such thing as a fatherly Providence watching over us, and no hereafter in which we may hope to reap a harvest that shall not decay—when, I say, we hear this new gospel of misery put forth in the name of Science, as it is every day, there can be no doubt as to the gravity of the question which is raised, nor can we wonder at the disquiet and anxiety which is so widely engendered. If it be true that increase of human knowledge contradicts the beliefs we have been accustomed to cherish, if the discoveries we are able to make by means of our natural faculties, are in reality incompatible with the foundations of our faith, then undoubtedly the most formidable obstacle the world has ever seen is set up to hinder men from believing.

But *is* all this true? That is the question we

have now to discuss, and as a contribution to such discussion I can attempt no more, within the limits to which I must confine myself, than briefly to recapitulate a few of the chief reasons which show that the assumptions with which we are confronted, are not only untrue, but the reverse of the truth; that the case of our opponents rests upon arguments not only invalid but preposterous.

And here I would remark that, as it seems to me, the champions of our own party are often to blame for the line they adopt. While the apostles of unbelief are loud-mouthed and confident, laying down with assurance what they declare to be the law, the defenders of orthodoxy are too often either timid and apologetical, or strenuous in the wrong way—exhibiting their want of acquaintance with the true nature of the teachings they undertake to refute. In either case much harm is done. The impression is produced that we can meet our antagonists only by misrepresenting them, and that if we venture to look them fairly in the face we are inevitably forced to make a pitiable display of our impotence, and have to content ourselves with a feeble attempt to show that after all the case against us is not absolutely proved, but that some loophole of escape may yet be found.

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This is not the temper which is likely to vindicate the ways of God to man. The invisible, as He Himself tells us, is made known to us by the visible, and the more we understand of the world whereof our senses can take cognizance, the more should we learn of Him who made it what it is, the more should we be drawn to mount from nature up to nature's God. And such, without question, is the fact.

Coming now to the matter itself, it is in the first place to be observed, that although, as I have said, the number of those is legion who undertake to speak in the name of Science, and interpret her lessons in a sense contrary to Faith, they are not as a rule entitled to the character they assume. It is the popular "scientist," to borrow the hideous title he has invented, unencumbered with sound knowledge, who finds all plain and easy where men far greater than he find mystery, who scatters abroad his crude and random infidelity with the reckless assurance which ignorance begets. When we turn to those who have the best right to speak, we find, in general, a very different tone. I need not dwell on the opinion of the greatest of scientific discoverers, Sir Isaac Newton, who declared that natural philosophy without God was an impossibility; for he lived two centuries

ago, and our self-sufficient generation might therefore decline to accept him as a witness. But Lord Kelvin is still with us, and has not he declared that "overpowering proofs of intelligence and benevolent design lie around us, showing us through nature the influence of a free will, and teaching us that all living beings depend upon one ever-acting Creator and Ruler"? Another of its Presidents, Sir William Siemens, likewise told the British Association that "all knowledge must lead up to one great result, an intelligent recognition of the Creator through His works." "We assume as absolutely self-evident," wrote Professors Stewart and Tait, "the existence of a Deity, who is the Creator and Ruler of all things." In a like sense speak Faraday, Clerk-Maxwell, Sir John Herschel, Sir Gabriel Stokes, Sir Joseph Dawson, to name but a few of those who—none will be bold enough to deny—stand in the very front rank of modern science.

So much for authority. When we turn to scrutinize the subject itself, this must strike us in the first place. The main point upon which the so-called rationalistic argument is based, is that experimental science is not able, by the methods in which it deals, to discover what must be, if it exists at all, altogether beyond its scope, and would be absolutely discredited

if it could be so discovered. Science deals with the forces and properties of matter ; what is not material it cannot touch. But no one ever imagined that God or the soul of man are anything material. On the contrary, if we could see them or touch them, if we could weigh them in a balance, or detect them in a test-tube, or affect them with a battery, they would be thereby shown not to be what we believe them. Accordingly, to say that because Science—meaning by that term experimental science—has nothing to report concerning them, therefore they do not exist, is like saying that there is no beauty in the poems of Shakespeare because chemistry fails to discover it, or in Westminster Abbey because though we examine its stones and timbers with the most powerful of microscopes we shall see nothing of it.

This leads naturally to another reflection. Science, as I have said, is justly proud of the advances she has made in recent years, and it is in the name of these her triumphs that the claim is advanced on her behalf to be the supreme instructress of man as to all which it is possible to know. But although, without doubt, the field of our knowledge appears very wide when we compare it with that of former ages, it is altogether paltry and insignificant in

comparison with our ignorance. To hear some men talk we might imagine that we have now sounded the depths of the universe, traced all effects to their causes, and torn aside every veil which shrouded the operations of Nature, forcing her to disclose to us the secrets she most jealously guarded. As a matter of fact we are still, to use Sir Isaac Newton's well-known simile, like little children picking up shells on the shore of the ocean. It may have receded a little more for us than for our ancestors, and enabled us to find some brilliant objects which they could not ; but for us as for them its impenetrable depths defy all scrutiny. Nor only this. It may be said with absolute truth that what discoveries we have been enabled to make do but intensify the mystery which lies beyond, and each scrap of knowledge we are able to glean brings with it fresh and perplexing problems which we are utterly unable to solve. To say that modern research has eliminated mystery from nature, is like saying that the telescope has done away with the wonders of the heavens. As an example, we may consider the ultimate elements of which the material universe is composed. In old days it was supposed that there were but four elements—earth, air, fire, and water. Now we have dis-

covered that, in round numbers, there are about eighty. Have we therefore removed all mystery? It would be more true to say that we have multiplied it twenty-fold. We know something of the behaviour in certain circumstances of the atoms into which these various elements are ultimately resolvable, but beyond this we know nothing. As Lord Salisbury put it in his presidential address to the British Association two years ago: "What the atom of each element is; whether it is a movement, or a thing, or a vortex, or a point having inertia; whether there is any limit to its divisibility, and, if so, how that limit is imposed; whether the long list of elements is final, or whether any of them have any common origin—all these questions remain surrounded by a darkness as profound as ever."

As to the causes of things, Science has never discovered one. She has doubtless followed up the chain of inter-dependent phenomena, of which we frequently speak as causes and effects, to a point higher than has ever been done before; but at whatever point she is forced to relinquish her scrutiny, the problem of the true cause remains inscrutable as ever. Of what discovery are we so proud as of Newton's great law of gravitation? Old philosophers knew as well as we that a stone will fall if it be dropped,

and they explained the phenomenon by declaring that every body naturally tends to the centre of its own sphere. We know better, and call such an explanation no explanation at all. It is the attraction of the earth, we say, which explains it all, for according to the formula which we learn at school, every material substance attracts every other with a force proportional directly to its mass, and inversely to the square of the distance. No doubt this is a great advance on the old philosophy; but are we, after all, very much nearer to the root of the matter? Why do bodies so attract one another? And how? By what means is the attraction conveyed? What is it? How is it that the pull of the earth beneath my feet, upon the roof above my head, passes through my body, and yet I am not conscious of it? The pull of the earth upon myself I feel—it is what I call my weight—but not that exerted upon other substances. So manifold are the difficulties with which this subject is surrounded, that Sir John Herschel termed that force of gravitation, of which we speak so familiarly, the “mystery of mysteries,” and Faraday thought the great law a paradox. Yet even were our ideas concerning its operation far in advance of what they are, it would still remain true that we have not arrived at the

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ultimate cause which can account for so familiar a phenomenon as the falling of a stone or of an apple, till we have discovered what or who it is that made that which makes it fall.

In connection with this topic it is well to remember that what Science can do is to discover "laws," and this is only another name for facts. Recently, for instance, we have been astounded to learn that there are rays of some kind, called X rays because we know nothing of their nature except that they are neither light-rays nor heat-rays, which can penetrate our flesh and reveal our skeletons. That is to say, we have just found out something in nature which has always been there without our knowing it. But too often it seems to be assumed that our achievements are far more important. Of a recent eminent man of science it was said, that having detected a certain substance and called it "protoplasm," he seemed to fancy, because he had invented the name, he had therefore created the thing. Science can but record what she finds in operation. She admires, and bids us admire, the laws she is able to trace. But these are not of her making, and though she may unquestionably claim high honour for the skill with which they have been investigated, we must endorse the sentiment expressed by Diderot—Is the formation of the universe

a less proof of intelligence than its explanation?

These are a few of the considerations which present themselves on the very threshold of our inquiry. Bearing them in mind, we may proceed to another point which will conveniently serve to illustrate our subject in the compendious manner which such an occasion as this requires.

It has been said that the first three words of the Bible convey three fundamental ideas, which we shall seek in vain in the writings of philosophers however profound, whose natural powers were not illumined by revelation. "In the beginning, God created." The idea of a beginning, before which the things we know by our senses did not exist; <sup>including God?</sup> of a Supreme Being, <sup>and who never existed</sup> who had no beginning, who was, when the heavens and the earth were not; and of the act of creation, <sup>which could not have been</sup> the calling of the universe out of nothing, at the will and by the power of Him who alone had His being of Himself. Here is the foundation-stone of all supernatural belief—not of Christianity alone, but of Theism itself. What, let us ask, is the witness of Science upon each of these all-important points?

And first as to the beginning. If there is anything which is proved by modern philosophy beyond all question, it is that such a beginning

there must have been. On such a point no exception can be taken to the evidence of the late Professor Huxley, and he emphatically declares that the phenomena with which astronomy deals, demonstrate by their very nature that they cannot have existed for ever. More than this. The law of the conservation and dissipation of energy, one of the greatest discoveries of our times, clearly proves that in its beginning the universe was in a condition to which its own forces could never have brought it, one from which, on the contrary, they can only more and more remove it. It was, in brief, like a clock wound up; the weights when left to themselves run down, and in doing so set the various parts of the mechanism in motion. But the more work they do the less power of doing work remains; and once they reach their lowest point all work is over, unless a power altogether different from theirs should intervene to replace them in their first position. Even so with the forces of the universe: they are ever spending their power of work, never adding to it—motion, heat, electricity, all the forms of energy with which nature is endowed, are constantly approaching their inevitable term. As Mr. Balfour has expressed it, "We sound the future, and learn that after a period, long compared with

the individual life, but short indeed compared with the divisions of time open to our investigation, the energies of our system will decay, the glory of the sun will be dimmed, and the earth, tideless and inert, will no longer tolerate the race which has for a moment disturbed its solitude." This, then, is the verdict of Science : that there was a beginning, and that for it no force whereof she takes cognizance can account.

But if so, she necessarily leads us on to the consideration of a Being beyond her ken, who alone could make that beginning possible ; who could construct the clock and wind it, and determine the order of its going ; who is not subject to the laws inexorably governing material things, but, existing for ever, does not grow old, nor part with any fragment of His power, and from whose plenitude alone can Nature have received these forces which make her what she is. The conception of such a Being, as Sir Isaac Newton has told us, is a necessary part of natural philosophy, and so far from this necessity being disproved by recent research, it may be said, with the late Bishop of Carlisle, that by the establishment of the laws of energy Atheism has been rendered "unscientific."

As to "creation," the question appears to be already answered. The calling into being

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of a universe which was not, and could not otherwise have been, *is* Creation. It need only be observed that here is the point at which infidel science always breaks down, and inevitably must do so. It will not, because it dare not, face the starting-point. It treats nature as a "going concern." From the course of events observed in the past, it argues to what may be anticipated in the future; and this it styles "philosophy," altogether ignoring the obvious consideration that the past, no less than the future, requires to be accounted for. As a conspicuous illustration of this method of dealing with the question, we may cite that doctrine of evolution of which we hear so much. Of that doctrine this is not the place to speak in detail. We cannot stay to inquire whether, as a matter of fact, the history of organic life, as we know it, is in accordance with evolutionary hypotheses—which such a geologist as Sir Joseph Dawson, and such a botanist as Mr. Carruthers, absolutely deny—nor can we spare time to examine the ambiguity of evolutionist terminology, and the consequent difficulty of determining what exactly is maintained. Let all be as its champions say it is. Let it be granted that one species of plants and animals has been evolved from another species, according to some law. Is

it not obvious that we must start with something which is to evolve, and that it must be capable of evolving? Whence came the thing, and whence the capability? The language of many so-called scientific writers might lead us to believe that the law of evolution, as Science has been able to ascertain it, is capable of explaining the origin of life as well as its developments. Nothing could be more erroneous. As to development, Science can offer a few conjectures, more or less plausible, but as to the origin of life she has to confess that she knows absolutely nothing. As Professor Tait writes: "To say that even the very lowest form of life can be fully explained on physical principles alone, is simply unscientific. There is absolutely nothing known in physical science which can lend the slightest support to such an idea." In fact, just as Science bears witness that the Universe must have had a beginning, so with equal emphasis she declares that, within the sphere of her observation, life can be derived only from a living parent. How far does this take us towards a solution of the great problem of its origin? Hens doubtless come from eggs, and likewise eggs from hens. But what of the beginning? Did the first hen come out of an egg that never was laid? Or was the first egg laid by a hen that never was hatched? One or the other we

must say ; and not till we have adequately accounted for the existence of the primordial germ, endowed with the mysterious potencies of life, have we done anything to elucidate the great problem of the origin of all things.

Here is the mystery which true Science must discern beneath the surface of every object which meets her view. As Tennyson has sung :—

“ Flower in the crannied wall,  
 I pluck you out of the crannies ;  
 Hold you root and all in my hand ;  
 Little flower, but if I could understand  
 What you are, root and all, and all in all,  
 I should know what God and man is.”

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## SCIENCE AND ITS COUNTERFEIT <sup>1</sup>

BY THE REV. JOHN GERARD, S.J.

THAT the age in which we live is nothing if not scientific, we are in no danger of forgetting, for there is none of its attributes of which we are more constantly reminded, or in which we take more pride. Nor can it be pretended that such pride is unreasonable, for while it is evident that in these latter days the domain of scientific discovery has been enlarged as it never was before, no one will deny that the advance of science, that is to say, of sound and solid knowledge, is a most legitimate motive for satisfaction and gratification.

But, at the same time, I will venture to inquire whether our self-satisfaction on this head be not in danger of being very seriously overdone—whether, in the case at least of the general public, there be not a grave risk lest the science of which we so loudly boast may become but a specious cloak for ignorance, and ignorance of the most pernicious kind, that which plumes itself on being wisdom.

Two branches of science may be distinguished—the pure, or theoretical, and the practical or applied—that

<sup>1</sup> A paper read at the Catholic Conference, Preston, September 11, 1907.

by which we subject the forces of nature to our own purposes and make them do our bidding. Of the latter, whereof we have so many instances continually around us, I have little now to say, and will only observe that in this regard we appear to be somewhat apt to take to ourselves credit which we have no right to claim, and to imagine that discoveries and inventions which are not of our making, elevate us above the men of previous generations who knew them not, and upon whom we therefore assume a right to look down as mere ignorant simpletons. We can, for example, travel sixty miles in as short a period as was required a few centuries ago to travel six ; we can send a message to New York in shorter time than it took our grandfathers to send one from London to Windsor ; a workman in one of our factories can do more work, and better, than a dozen used to be able to accomplish. But it is evident that it was not we who discovered the steam-engine, the electric telegraph, or the spinning-jenny ; the powers of which we find ourselves possessed are an inheritance from others, and a monument, not of our intelligence, but of theirs. It may very well be that our ancestors, who had none of these means at their disposal, were abler and better workers in their several fields than we are, as contributing more of their own, and having consequently a better title to honour. The spirit of self-laudation and assumption of superiority over other generations, upon grounds which furnish no real justification for it, is doubtless very common amongst us, and is sedulously fostered by many writers and speakers who have the public ear ; but it is hard to name any which is more unreasonable and which so unfits us for true progress in science.

When we turn to pure science, to that which regards the intellectual side alone, apart from utilitarian applications, we find the same consideration holding good, and with even greater force. It is plain and manifest that we know vastly more concerning nature than did our forefathers, but does this necessarily mean that intellectually we are their superiors? Schoolboys, at the present day, learn many truths of science of which Sir Isaac Newton knew nothing, but no one, I suppose, would therefore rank them above him. It is, once again, not the mere possession of knowledge which constitutes eminence, but the share which the possessor has in its acquisition; and it may easily be, not only that he who has less should deserve greater credit than another who has more, but that a man not merely ignorant of what another knows, but actually maintaining an erroneous scientific doctrine against the truth, should exhibit more of the scientific spirit than his opponent. To take an extreme instance. Upon whom are we taught to look down with more unmeasured contempt than the opponents of Copernicus and Galileo, the men who strove to discredit the new astronomy and persisted in maintaining that the sun moved and the earth stood still? But one of the most obstinate amongst them was Lord Bacon, who is recognized and honoured as the great leader to whom is chiefly due the introduction of that experimental system of natural philosophy, to which the marvellous advances of science are directly due. We shall hardly be inclined to assign less credit to him than to the multitude of those who delight in the hideous title of "scientists," and obtain all the knowledge of which they are so proud from text-books or popular lectures.

And this brings us to the main point. While the mere possession of knowledge, which we have such facile means of acquiring without any merit of our own, is apt to give us an inordinate conceit of ourselves, for which there is no real warrant, there is danger likewise lest our study of science itself should become thoroughly unscientific. It is the first principle of science that nothing should be taken on faith, that we should prove all things, and take no step forward till we have made quite sure of our ground. As we have been warned by Dr. Windle,<sup>1</sup> we must clearly understand how much of what we learn is fact and how much is hypothesis, and what support any hypothesis presented to us receives from the facts which alone can give it any solid value.

But under present conditions how few are able to observe such a standard! It is plainly impossible for the great majority of men to pursue scientific research for themselves, or even to sit at the feet of eminent instructors who have trodden the path of original investigation and so learnt how serious is the responsibility which attaches to those who act as the interpreters of science for the benefit of others less advantageously circumstanced. And as, at the same time, every self-respecting person is required to be up to date in this regard, and to hold views which he takes to be in accord with the latest scientific results, it inevitably follows that a vast multitude must have recourse to those who will supply them with a mental outfit ready-made, and nurture their minds on what—to use the inelegant term of patent-food purveyors—has been “predigested” for them.

Most unfortunately, too, many who undertake to

<sup>1</sup> See *Scientific Facts and Scientific Hypotheses* (C.T.S., 1d.).

supply the demand for popular scientific instruction, whose wares are most assiduously pressed upon public attention, and who are very commonly regarded as authorities from whom there is no appeal, have no claim to the character they assume. "Scientists," as they style themselves, they may be, for this is an elastic term and may be applied to any one who makes science the topic of which he treats—just as whosoever reports for a newspaper may call himself a journalist. But they certainly are not men of science. It would even appear that often they have no great interest in science itself, of which they profess to make so much, its real attraction for them being that in it they think to find a purely mechanical explanation of the universe, which shall banish from the minds of men all idea of the supernatural—of God, of religion, of a life after death, and of the obligations by which our temporal existence must be regulated in prospect of eternity. The constant and dominant note of their teaching is that all such notions are exploded absurdities, which science, having sounded all the depths of knowledge, has shown to be but the baseless visions of men's disordered dreams; while so loud and so positive are these assurances, that thousands and hundreds of thousands at the present day are doubtless persuaded that such a belief is the only one fit for a reasonable being to entertain.

At the same time, not only, as has been said, have these self-constituted instructors no such authority as they claim (and commonly have their claim allowed), but moreover in their practice they actually contradict those principles upon which real men of science insist as being necessary for the attainment of true know-

ledge, and thus they accustom those whom they influence to commit in the name of science the very faults which science most abhors.

In the first place, the authors of whom we are speaking know nothing of scientific caution—nothing of what Professor Huxley styles the art of arts, that of saying, "I do not know." For them there are no dark places in nature, they are ready at any moment to turn their searchlight upon its every nook and cranny. "I wish," said Lord Melbourne, when Prime Minister, "I wish I was as sure of *anything* as Tom Macaulay is of *everything*," and in like manner our acknowledged leaders in science—our Kelvins, our Thomsons, our Crookes, Gills, Wilsons, Lodges, and Pasteurs, even our Huxleys and Darwins—might well envy the sublime assurance of those who contribute "scientific" articles to popular magazines, or load our bookstalls with sixpenny treatises which are to impart to the million the best results of modern research.

It must suffice at present summarily to indicate and illustrate some of the principal charges to which such performances lay themselves open.

To begin with—as for their purpose they must—such writers vastly exaggerate the achievements of science, and give it to be understood that she has taken entire possession of territories on which, as she herself declares, she has not even set her foot. Take, for example, the origin of life. It is constantly assumed that, however inscrutable this was in former days, it is now fully explained, on purely naturalistic principles, by the famous theory of Mr. Darwin.<sup>1</sup> But—even if

<sup>1</sup> See, for example, Haeckel's *Riddle of the Universe*, p. 92. Professor Haeckle is of course within his own department a

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we set aside the fact, that, as we know, the Darwinian theory does not now hold the authoritative position it once did—it is obvious to any one who understands what this theory is, that it has no bearing whatever, nor pretends to have any, upon the point in question; and to this effect there is no more emphatic witness than Darwin himself. He on various occasions declared that he knew nothing, and never hoped to know anything, as to how life originated; that in his opinion no evidence, worth anything, has yet been brought for its mechanical production; and that, for the present at least, the question seemed to him beyond the pale of science.

No less mysterious, for the man of science, than the origin of life, is its nature. In the organic structures with which life, as we know it, is invariably associated, there is not to be found any chemical element which is not also to be found in inorganic matter. Yet between the organic and inorganic is fixed a great gulf which science cannot attempt to bridge. As Professor Huxley tells us, our present state of knowledge furnishes no link between the living and the not living. So the evolutionist professor; but not so Mr. Edward Clodd, one of the most active amongst our popular scientists. "The origin of life," he assures us,<sup>1</sup> "is not a more stupendous problem than the origin of water, it hides no profounder mystery than the lifeless: it is only a local and temporary arrest of the universal movement of scientific authority of the first class. *- you contradict yourself!* But it is not from anything he has learnt in scientific investigation that he bases his theories which he proclaims in his *Riddle of the Universe*, and similar works, which are not taken seriously by any who can be styled scientific men.

<sup>1</sup> *Story of Creation*, p. 150.

towards equilibrium,"—which of course makes things clear to the meanest capacity.

Thus, again, with the complex processes and apparatus which organic life involves; nothing can be simpler, according to our "scientists," than to account for them all. We have only to imagine what would have occurred if we had the direction—and there we are. Here are a few samples furnished by another author, extremely popular in his day, the late Mr. Grant Allen. A long-tailed reptile was to be developed into a short-tailed bird—"Accordingly the bones soon grew fewer in number and shorter in length, while feathers simultaneously arranged themselves side by side on the terminal hump." What could be easier? In like manner, a water-snail, *paludina*, was with equal facility transformed into a land-snail, *cyclostoma*. It took to living on dry land, "and so acquired the habit of producing lungs"—which, we are assured, could easily be acquired by any soft-bodied animal like a snail. In the same fashion, but in the opposite direction, a land-buttercup took "to living pretty permanently in water," and so became the water-crowfoot, the modifications of stem and leaves necessary to fit the plant for its altered circumstances being of course forthcoming without further explanation.

And all this is science! Rather, we should say, that no man having any knowledge of the matters whereof he discoursed so glibly, could possibly have uttered such absurdities.

Another point to be noticed is the fondness of such writers and speakers for masking ignorance behind a shroud of mere words which convey no meaning to the reader or hearer. They do, in fact, the very thing for

which we rightly condemn our pre-scientific ancestors. These were accustomed to explain the phenomena they witnessed by mere phrases which signified nothing. If stones fell to earth, or flames flickered towards the sky, it was, said they, because "every element tends to its own sphere." While if water rose in a pump, it was because "nature abhors a vacuum."

We have doubtless long ago got beyond explanations so manifestly futile, but does it not come to very much the same thing if we merely give a name to something which we do not understand, and then use the name as an explanation? When, for example, it is asked why a hen's egg produces a chicken and a duck's egg a duckling, or an acorn an oak, our paper scientists reply that such products are due to "heredity," and are produced by forces "inherent" in the germ from which they spring, which is supposed to solve the whole mystery. Unfortunately, however, the facts shrouded under such terms constitute the very mystery to be solved, and as Professor Huxley acknowledges, the genesis of every chick that we see hatched is as far beyond our comprehension as that of the universe. "Heredity" is only a term conveniently expressing the truth set forth in the first chapter of Genesis, that like begets like, that creatures produce offspring each after its own kind. As George Canning sang in the *Anti-Jacobin*:

We see, in plants, potatoes 'tatoes breed,  
Uncostly cabbage springs from cabbage seed,  
Lettuce to lettuce, leeks to leeks succeed :  
Nor e'er did cooling cucumbers presume  
To flower like myrtle, or like violets bloom.

We do not need science to tell us that. But why or how it is brought about we know no more than in the days of Adam.

As to "inherent" forces or potencies, it will be sufficient to quote an observation of the late Lord Grimthorpe :

"The word 'inherent' passes with some people for an explanation, but unfortunately it is the very thing that wants explaining. 'Inherent' only means 'sticking in,' and nobody will doubt that if such a power once got into an atom of matter it would be likely to stay there. It is amazing that people in this boasting age of science should promulgate and accept such empty phrases for a solution of the problem of the origin of the laws of nature."

For a final example I will turn to the province of astronomy, in which again our friends are quite at home, while the immensity of the subject frequently inspires a magnificence of language which, even if not very intelligible, can hardly fail to be impressive. This, for instance, is how Mr. Clodd sets forth, as a scientifically verified truth, that the universe is an automatic self-sufficing piece of mechanism, which having started of itself, will continue going everlastingly, without any need of a Creator :

"The ultimate transference of all energy to the ethereal medium, involves the end of the existing state of things. But the ceaseless redistribution of matter, force-clasped and energy-riven, involves the beginning of another state of things. So the changes are rung on evolution and dissolution, on the birth and death of stellar systems—gas to solid, solid to gas, yet never quite the same—mighty rhythmic beats, of which the

earth's cycles and the cradles and graves of her children are minor rhythms."

Another member of the school—one who is at present constantly in evidence—tells us with equal assurance that, astronomy having brought the evolution of the original cosmic nebula to a certain point, "Other branches of science take up the tale and *declare* that the continued action of these same forces, and of others like them, has resulted in . . . that 'vital putrefaction of the dust' which we call living matter, and which has now continued the evolutionary advance so far as to result in the existence of man. Hence we believe that Newton, Shakespeare, and Beethoven were potential in that nebula, as were Kant and Laplace, whose destiny it was to advance and establish the nebular theory of their own and our origin."<sup>1</sup>

With the confident utterances of these gentlemen it is instructive to compare the words of Sir David Gill, the distinguished astronomer at the Cape of Good Hope, in his presidential address to the British Association the other day (July 31st) at Leicester. He too spoke of the stars, and the evidence furnished by spectrum analysis of cosmic processes in the realms of space. But the conclusion he draws is by no means that which we have just heard. "The stars," he says, "are the crucibles of the Creator." We have, he continues, arrived at the grand discovery that a great part of space, so far as we have visible knowledge of it, is occupied by two majestic streams of stars, travelling in opposite directions, and in the cryptograms of their spectra has been deciphered the amazing truth that the stars of both streams are alike in design, alike

<sup>1</sup> Dr. C. W. Saleeby, *Evolution the Master-Key*, p. 72

in chemical constitution, and alike in process of development.

And what then? Whence have they all come? Are the hundreds of millions of stars we are able to observe the sole occupants of space? Or are they but one small item in a vaster universe of which we have no knowledge? His answer is clear and unhesitating—  
“We do not know.”

And he goes on to indicate where alone the knowledge which transcends our own can be found.

“Canst thou,” he asks, “by searching find out God? Canst thou find out the Almighty unto perfection?”

Here we may stop. There are those, we know, who do not hesitate to rush in where angels fear to tread; but enough has perhaps been said to show that it is not those whose knowledge is greatest who take credit for knowing everything, nor is it they who are most ready to say in their heart, or upon our book-stalls, that there is no God.

#### NOTE.

Since the foregoing paper was read at the Preston Conference, Mr. Edward Clodd has loudly complained through the public press that it grossly misrepresents him. It is disingenuous, he protests, to quote him as saying that “the origin of life is not a more stupendous problem than the origin of water, and hides no profounder mystery than the lifeless,” unless it be added that he likewise says “the ultimate cause which bringing lifeless bodies together gives living matter as the result is a profound mystery.”

He is thus represented, he complains, as a materialist,

whereas in the very work quoted he thus explains himself: "Dealing with processes, and not with the nature of things in themselves, evolution is silent concerning any theories that may be formulated to justify man's insatiate curiosity about the whence and the whither."

With every desire to do Mr. Clodd the fullest justice, it is not very easy to discover the point of the grievance of which he makes so much. There can be no doubt, on his own admission, that he declares the origin of life to be no more mysterious than the origin of water, and it is equally clear that in making such an assertion, whatever he may have said elsewhere, he contradicts such men as Darwin and Huxley, according to whom the origin of life adds a fresh mystery to those presented by the inorganic world. And this, as will be seen, was the whole purport of the quotation from his book.

As to the charge of materialism, which term was not actually used of his doctrines, it appears incredible that he should repudiate it, for the whole scope and purport of his teaching is undoubtedly materialistic in the only intelligible sense of the word. He complains that he is represented as "attempting to find a purely mechanical explanation of the universe," and there can be no question that this is exactly what he does. It is true that every now and then he acknowledges the limited extent of our knowledge, speaks of the impenetrable mysteries which surround us, and declares that beyond the bounds of the phenomenal we can neither affirm nor deny, but only confess ignorance. But, despite such avowals, ignorance is just what he never confesses. He speaks throughout as if he knew all that had hap-

pened in the genesis of the universe, even far beyond the limits of the phenomenal, and he confidently presents his readers with an explanation of the production of everything, not excepting the soul of man, which is purely mechanical.

Thus, he tells us that the universe—(or “that which is”)—is made up of matter and motion, and that, given these as its raw materials, the interaction of motion upon matter is sufficient to account for the totality of things—living and non-living alike :

That, the nebulous stuff of which the universe is the product held latent within its diffused vapours, not only the elements of which land and sea are built, but man and all his works :

That, all which is, from fire-fused rock to the genius of man, was wrapped up in primordial matter, with its forces and energies :

That, thought and emotion have their antecedents in molecular changes in the matter of the brain, and are as completely within the range of causation and as capable of mechanical explanation as material phenomena :

Finally, that, “The Story of Creation is shown to be the unbroken record of the evolution of gas into genius.”

If this is not materialism, what is it? And how can a writer seek to shelter himself behind protestations of ignorance who claims to possess such knowledge as can justify all these dogmatic statements?

Mr. Clodd, moreover, declares that the charges made against his teachings are equally applicable to the master minds at whose feet he has sat. It is, however, the precise point of the charge that such is not the case, that the men who have a right to speak in the

name of science make no pretence to such omniscience, and refrain from the confident assertions concerning matters about which nobody knows anything, of which those cited above are specimens. Sometimes they have gone further, and actually denounced the doctrines thus put forward as scientific truths. A notable example is afforded by the theory of Force and Energy excogitated some years ago by Mr. Clodd in conjunction with his friend Grant Allen, in which he appears to take no little pride, for he still puts it prominently forward in his account of the genesis of the material universe, and makes his whole system of cosmic evolution depend upon it. The object of Messrs. Allen and Clodd was to reconstruct the fundamental science of dynamics, which as bequeathed to us by Galileo and Newton, appeared to them unsatisfactory; but any one who has any knowledge of the subject, however elementary, must at once perceive that they have not comprehended its first principles. Of the theory which they elaborated, Sir Oliver Lodge, whose authority as a physicist is unimpeachable, pronounced<sup>1</sup> that it is "simply an emanation of mental fog," that "blunders and mis-statements abound on nearly every page," and that there evidently are persons to whom ignorance of a subject offers no sufficient obstacle to the composition of a treatise upon it.

Yet this precious theory Mr. Clodd, with even more than his wonted assurance, presents as an undoubted scientific truth!

<sup>1</sup> *Nature*, January 24, 1889.



## SOME SCIENTIFIC INEXACTITUDES <sup>1</sup>

BY THE REV. JOHN GERARD, S.J.

WE all know that in current politics "Terminological Inexactitudes" have won for themselves no inconspicuous position. Much also might be said in support of the view that in our present omniscient age the art of accurate quotation is like to become extinct, so frequently do we hear familiar citations, which are invariably given wrong. A conspicuous instance is the famous *Credo quia impossibile est*, constantly attributed to Tertullian, which, however, he never wrote. In history, again, Cromwell's well-known "Take away that bauble," when he had the Mace removed from the House of Commons, was in reality something far more characteristically significant—"Take away that *fool's bauble*," as will be seen on reference to so easily accessible an authority as Murray's *New Oxford Dictionary*.

In regard of literary citations, such irregularities are even more general, not to say universal. It is not many years ago that the *Times* itself, having occasion to men-

<sup>1</sup> Reprinted from *The Month*, May, 1908.

tion Hamelin, the town of the Pied Piper, must needs go on to place it on the Elbe, whereas, as everybody should know,

“The river Weser deep and wide  
Washes the town on the southern side.”

To give but a couple of samples which serve to exhibit the staying-power of a misquotation. Pope wrote, in his *Imitations of Horace*,<sup>1</sup>

“Unhappy Dryden! In all Charles’s days  
Roscommon only boasts unspotted bays,”

but as the lines are usually given, except by an editor such as Mr. Elwin, we have “lays” substituted for “bays,” manifestly a change much for the worse. What is still more regrettable, Dr. Johnson himself, in his *Lives of the Poets*, lent his authority to the mistake, if indeed he did not originate it.

A still more unpardonable blunder has been introduced, and has taken root, in Sheridan’s comedy, *The Rivals*,<sup>2</sup> where Mrs. Malaprop is made to speak of “the Derbyshire petrifications.” Now it should be self-evident that, being Mrs. Malaprop, she could by no possibility have managed so formidable a word correctly, and that Sheridan must have introduced it for the sake of a malapropism which at once suggests itself. Nevertheless, in all modern editions, from that of 1821, edited by Tom Moore, onwards to the present day, “petrifications” retains its place apparently unchallenged.

<sup>1</sup> Book ii. i.

<sup>2</sup> Act v. sc. i.

Not till we go back to those which were published in Sheridan's own lifetime do we find the obviously correct reading, "The Derbyshire *putrefactions*."

But of such exhibitions, common as they may be in other departments, there is one in which we might expect to find no trace, namely, that of science; for is it not her peculiar and characteristic merit that she trains the minds of her votaries to the most scrupulous accuracy, in every minutest particular, and teaches them to accept nothing which they have not fully verified? And yet it is actually here that we find the worst instances of inexactitudes, on a larger scale and of a graver character than any we have considered.

To begin with a notable instance, which concerns the great man whom we usually hear styled the "Founder of Inductive Philosophy." As Lord Macaulay wrote in his well-known essay:

"The vulgar notion about Bacon we take to be this, that he invented a new method of arriving at truth, which method is called Induction, and that he detected some fallacy in the syllogistic reasoning which had been in vogue before his time. This notion is about as well founded as that of the people who, in the Middle Ages, imagined that Virgil was a great conjurer. Many who are far too well informed to talk such extravagant nonsense entertain what we think incorrect notions as to what Bacon really effected in this matter."

Still more apposite is the account given by Professor Huxley. Discoursing on the phenomena of organic nature, after warning his auditors not to suppose that

scientific investigation is "some kind of modern black art," he thus continued: <sup>1</sup>

"I say that you might easily gather this impression from the manner in which many persons speak of scientific inquiry, or talk about inductive and deductive philosophy, or the principles of the 'Baconian philosophy.' I do protest that, of the vast number of cants in this world, there are none, to my mind, so contemptible as the pseudo-scientific cant which is talked about the 'Baconian philosophy.' To hear people talk about the great Chancellor—and a very great man he certainly was—you would think that it was he who had invented science, and that there was no such thing as sound reasoning before the time of Queen Elizabeth.

"There are many men who, though knowing absolutely nothing of the subject with which they may be dealing, wish nevertheless to damage the author of some view with which they think fit to disagree. What they do is not to go and learn something about the subject; . . . but they abuse the originator of the view they question, in a general manner, and wind up by saying that, 'After all, you know, the principles and method of this author are totally opposed to the canons of the Baconian philosophy.' Then everybody applauds, as a matter of course, and agrees that it must be so."

How utterly and obviously wrong is such an idea, both these writers proceed to show. As Macaulay says:

"The inductive method has been practised ever since the beginning of the world by every human being. It is

<sup>1</sup> *Collected Essays*, ii. p. 301.

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constantly practised by the most ignorant clown, by the most thoughtless schoolboy, by the very child at the breast. That method leads the clown to the conclusion that if he sows barley he shall not reap wheat. By that method the schoolboy learns that a cloudy day is the best for catching trout. The very infant, we imagine, is led by induction to expect milk from his mother or nurse, and none from his father. Not only is it not true that Bacon invented the inductive method: but it is not true that he was the first person who correctly analyzed that method and explained its uses. Aristotle had long before pointed out the absurdity of supposing that syllogistic reasoning could ever conduct men to the discovery of any new principle, had shown that such discoveries must be made by induction, and by induction alone, and had given the history of the inductive process, concisely indeed, but with great perspicuity and precision."

And as, in like manner, Huxley points out: "The method of scientific investigation is nothing but the expression of the necessary mode of working of the human mind. It is simply the mode by which all phenomena are reasoned about—rendered precise and exact": just, he adds, as a butcher or baker weighing out our provisions employs scales identical in principle with those of a physicist or chemist in his laboratory, though far less delicate and accurate. In fact, says the Professor, as M. Jourdain talked prose all his life—without knowing it, so do men in general employ induction.

The real merit which, with Macaulay, he attributes to

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Bacon, is that of having directed attention to the study of matters for which the inductive method is necessary, as it was always known to be. Macaulay writes :

“If others had aimed at the same object with Bacon, we hold it to be certain that they would have employed the same method. It would have been hard to convince Seneca that the inventing of a safety-lamp was an employment worthy of a philosopher. It would have been hard to persuade Thomas Aquinas to descend from the making of syllogisms to the making of gunpowder. But Seneca would never have doubted for a moment that it was only by a series of experiments that a safety-lamp could be invented. Thomas Aquinas would never have thought that his *barbara* and *baralip-ton* would enable him to ascertain the proportion which charcoal ought to bear to saltpetre in a pound of gunpowder. Neither common sense nor Aristotle would have suffered him to fall into such an absurdity.”

Another example of inexactitude, still more remarkable, is furnished by Professor Huxley himself, to whose trenchant criticism we have been listening.

In his famous Lay Sermon on “The Physical Basis of Life,”<sup>1</sup> he set himself strenuously to combat the notion that there is in living creatures any such thing as a vital principle, over and above the physical forces which operate in lifeless matter also:<sup>2</sup> in support of which view he argued thus :

<sup>1</sup> *Lay Sermons*, No. VII.

<sup>2</sup> The opposite view is maintained in Professor Windle's recent book, *What is Life?*

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“The existence of the matter of life depends on the pre-existence of certain compounds; namely, carbonic acid, water, and ammonia. Withdraw any of these three from the world, and all vital phenomena come to an end. Carbon, hydrogen, oxygen, and nitrogen are all lifeless bodies. Of these, carbon and oxygen unite, in certain proportions and under certain conditions, to give rise to carbonic acid; hydrogen and oxygen produce water; nitrogen and hydrogen give rise to ammonia. These new compounds, like the elementary bodies of which they are composed, are lifeless. But when they are brought together, under certain conditions they give rise to the still more complex body, protoplasm, and this protoplasm exhibits the phenomena of life. I see no break in this series of steps in molecular complication, and I am unable to understand why the language which is applicable to any one term of the series may not be used of any of the others. We think fit to call different kinds of matter carbon, oxygen, hydrogen, and nitrogen, and to speak of the various powers and activities of these substances as the properties of the matter of which they are composed. When hydrogen and oxygen are mixed in a certain proportion, and an electric spark is passed through them, they disappear, and a quantity of water, equal in weight to the sums of their weights, appears in their place. There is not the slightest parity between the passive and active powers of the water and those of the oxygen and hydrogen which have given place to it. . . . We call many strange phenomena the properties of the water,

and we do not hesitate to believe that, in some way or another, they result from the properties of the component elements of the water. We do not assume that a something called 'aquosity' entered into and took possession of the oxide of hydrogen as soon as it was formed, and then guided the particles to their place in the facets of the {ice} crystal, or amongst the leaflets of the hoar-frost. On the contrary, we live in the hope and in the faith that, by the advance of molecular physics, we shall by and by be able to see our way as clearly from the constituents of water to the properties of water, as we are now able to deduce the operations of a watch from the form of its parts and the manner in which they are put together. Is the case in any way changed when carbonic acid, water, and ammonia disappear, and in their place, *under the influence of pre-existing living protoplasm,*<sup>1</sup> an equivalent weight of the matter of life makes its appearance? . . . What justification is there, then, for the assumption of the existence in living matter of a something which has no representative, or correlative, in the not-living matter which gave rise to it? What better philosophical status has 'vitality' than 'aquosity'?"

Before we proceed to consider the particular example of misquotation which this exposition introduces, it must be noticed that here we have already exhibited an inexactitude of most serious character, though of a class somewhat different from that with which we are now concerned. No serious philosopher, certainly none of

<sup>1</sup> Italics mine.

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the despised Scholastics, ever for a moment supposed that a mere abstraction, like "aquosity" or "vitality" could intervene to play any practical part and change the nature of things. Nobody ever imagined that when we light a candle we introduce a new element "luminosity," in virtue of which it becomes luminous. This would indeed be to employ a term to which no meaning could possibly attach. What really happens is that in the lighted candle chemical energy is set up, introducing an objective force, not operating previously, which causes those undulations of ether to which is due the phenomenon we call light. This production of light we style "luminosity," but it is a result of force, not the force to which that result is attributable.

Exactly similar is the case of "vitality." Those whom Professor Huxley speaks of as believing in it, hold it to be the result of a force producing objective phenomena no less manifest than light, phenomena which no force discoverable by our senses can originate, but which obviously require a cause capable of producing them, and so indicate the presence of *something* no less real than gravitation, electricity, or chemical affinity—though not subject, as are these, to physical observation and experiment. There is a wide difference between the types set up to compose the passage just quoted from Professor Huxley and the same in a "printer's pie," but would any one say that the difference is caused by an element of "mentality" present in the one case, absent in the other, and not by the human intellect to which the

manifestation of mind bears witness? Or would any one attempt to explain the depth of Burke's political views as being due to their profundity?

But, as has already been intimated, all this is subsidiary to an illustration most germane to our present topic. In support of the argument to which we have listened, Professor Huxley then proceeds :

“Why should ‘vitality’ hope for a better fate than the other ‘ity’s’ which have disappeared since Martinus Scriblerus accounted for the operation of the meat-jack by its inherent ‘meat-roasting quality,’ and scorned the ‘materialism’ of those who explained the turning of the spit by a certain mechanism worked by the draught of the chimney?”

Here we have an example of inexactitude which would be hard to beat. There is, to begin with, a very serious misquotation, for it is not Martinus to whom Pope attributes this philosophy of the smoke-jack, but “the Society of Freethinkers,” who endeavoured, seemingly without success, to convert him to their view. Moreover, which is still more important, the illustration, such as it is, tells just the opposite way to that here intended, and the system of the Freethinkers corresponds, not to that of the Vitalists, but to Professor Huxley's own. It is thus that they state it :<sup>1</sup>

“In every jack there is a *meat-roasting* quality, which neither resides in the fly, nor in the weight, nor in any particular wheel of the jack, but is the result of the whole composition: So in an animal, the self-

<sup>1</sup> *Martinus Scriblerus*, c. xii.

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consciousness is not a real quality inherent in one being (any more than meat-roasting in a jack) but the result of several modes or qualities in the same subject. As the fly, the wheels, the chain, the weight, the cords, &c., make one jack, so the several parts of the body make one animal. As perception or consciousness is said to be inherent in the animal, so is meat-roasting said to be inherent in the jack. As sensation, reasoning, volition, memory, &c., are the several modes of thinking: so roasting of beef, roasting of mutton, roasting of pullets, geese, turkeys, &c., are the several modes of meat-roasting. . . .”

In this exposition of the Freethinkers' system there is no mention, be it observed, of the draught in the chimney, which, as Professor Huxley rightly implies, is the true cause that the jack roasts meat. And if this essential element be introduced, the comparison must be not with the Professor's theory of life, as we have heard him set it forth, but with that of the Vitalists whom he wishes to confute: for the said draught will stand for the animating principle which it is the whole object of his argument to prove superfluous.

On the other hand, his own system is clearly on all fours with that at which he laughs, as may be seen from a concrete application thereof.

There is another kind of jack sometimes found in chimneys, known as a jackdaw, and as the smoke-jack is composed of fly, weights, wheels, and chains, so the jackdaw is made up of water, ammonia, and carbonic acid. The smoke-jack has a meat-roasting (0000), (0000)

makes its presence desirable in a kitchen : the jackdaw has an egg-stealing quality rendering its presence very undesirable in a game-covert. The meat-roasting quality of the smoke-jack resides neither in fly, weight, wheel, nor chain, but is the result of the whole composition. In like manner, neither oxygen, hydrogen, nitrogen, nor carbon has any disposition to steal eggs, but when these elements are combined in proper proportions, and (trifling circumstance) under the influence of "pre-existing living protoplasm" - this, moreover, being contributed by a jackdaw—the resulting compound is found to be endowed with a thievish propensity, leading it to steal, amongst other things, eggs, cherries, and sixpences. The comparison between the two jacks appears to be as close in all respects as it is the nature of comparisons to be.

Another instance of inexactitude is even more remarkable, on account of the solemnity of the occasion on which it was produced. In his presidential address to the British Association at York, August 1, 1906, Sir Edwin Ray Lankester, reviewing the recent progress of Science in her various branches, spoke thus in regard of Astronomy :

"As recently as last April, at the Royal Astronomical Society, two important papers were read—one by Mr. Cowell and the other by Mr. Stratton—which had their roots in Sir George Darwin's work. The former was led to suggest that the day is lengthening ten times as rapidly as had been supposed, and the latter showed that in all probability the planets had all turned upside down

since their birth. *And yet M. Brunetière and his friends wish us to believe that science is bankrupt and has no new things in store for humanity.*"

The reference in the passage here italicized is of course to the late M. Brunetière's audacity in speaking of the bankruptcy or insolvency (*faillite*) of science, a heterodox sentiment which in certain quarters raised no less indignation than of old would have been excited by disrespect shown towards Diana of the Ephesians. The only meaning that can possibly be attached to the words we have heard, is that M. Brunetière denied the capability of science to make in such a field as astronomy discoveries like those which were quoted as having actually, or at least conjecturally, been made.

But on a previous occasion, when a charge of similar character was brought against him, M. Brunetière had explained, in language which might seem to admit of no mistake, that he meant nothing of the sort. In his own words :

"Non seulement je n'ai pas nié les progrès de la science—le téléphone, ou le vaccin du croup—ce qui serait aussi ridicule que de nier en plein midi la clarté du soleil—mais je l'ai dit textuellement. —Où sont celles de leurs promesses que la physique, par exemple, et la chimie, n'aient pas tenues, et au delà?"<sup>1</sup>

No one but a fool, and it will not be said that M. Brunetière was *that*, could attempt to maintain that science is incapable of doing what we see her do every day, and it might have seemed worth while to make sure

<sup>1</sup> *La Science et la Religion*, p. 101-102.

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what so eminent a man really meant, before saddling him with so grotesque an absurdity. Had this obvious precaution been taken, it would have been at once found that what M. Brunetière disallowed were the extravagant pretensions which some people have advanced on behalf of science, to overstep her own boundaries, and teach man a better religion than was ever known before. Not only, however, has such an idea never been countenanced by those best authorized to speak in her name, but by no one has it been more vigorously repudiated than Sir Edwin Ray Lankester himself, who has told us that no one who understands what science is can even conceive the possibility of arriving by means of her at that very knowledge which M. Brunetière declares to be beyond her reach, namely, "those beliefs and hopes which we call 'religion.'" "These things," he added, "are not 'explained' by science, and never can be."<sup>1</sup>

It would thus appear that when he spoke as he did, the President of the British Association had not thought it necessary to ascertain what M. Brunetière really said, but was content to base his disparaging remark upon a phrase which it is customary to represent as derogatory to the sacred name of Science.

Not to multiply instances of inexactitude, which might be continued indefinitely, we may conclude with one which figures no less constantly than the *Credo quia impossibile* of Tertullian, and, like it, is favoured by writers who love to quote great names without the irksome labour of consulting original sources. It is thus

<sup>1</sup> Letter in the *Times*, May 19, 1903.

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given by Professor Haeckel, in his notorious *Riddle of the Universe*:<sup>1</sup>

“When the famous French astronomer, Laplace, was asked by Napoleon where God, the Creator and Sustainer of all things, came in, in his system, he clearly and honestly replied: ‘Sire, I have managed without that hypothesis.’ That indicated the atheistic character which this mechanical cosmogony shares with all the other inorganic sciences.”

But if any one will take the trouble, which Professor Haeckel has evidently considered unnecessary, of consulting the works of Laplace himself, or those who could speak of him with authority, he will find that such an account is a gross travesty. In none of Laplace’s writings is there anything to justify the charge of atheism, and in one of them,<sup>2</sup> having cited the remark attributed to Alphonso X of Castile, that if God had consulted *him* he could have suggested a much better system of the world, Laplace adds: “By these words, which have been branded as impious, the king signified that they were still a long way from understanding the mechanism of the universe”: an observation which obviously does not accord with the view taken by Haeckel.

Moreover, according to M. Faye,<sup>3</sup> the purport of his reply to Napoleon was quite different from what we have heard. The point of the Emperor’s question regarded,

<sup>1</sup> Popular edition, p. 92.

*Exposition du Système du Monde*, book 11, p. 4.

<sup>2</sup> *Sur l’Origine du Monde*, p. 140.

not the origin of the world, but its actual constitution. Owing to the imperfection of the observations of his time, Newton had discovered in the mechanism of the solar system an element of instability, which seemed to require the occasional intervention of direct creative power to keep it going. With better observations Laplace was able to show that such interferences were needless, and it was to this that his reply referred. As M. Faye writes: "It was not God whom he treated as an hypothesis, but His intervention at a particular juncture." Moreover, on the authority of M. Arago, cited by Faye, Laplace having learnt before his death that the story repeated by Haeckel was to be related in a biographical notice, begged his friend to procure its suppression.

Nevertheless it will doubtless proceed merrily on its course, and enjoy the same perennial vogue as Mrs. Malaprop's "petrifications."

Manifestly, the wide diffusion of scientific teaching, and still wider of scientific talk, has not rendered obsolete the precept bequeathed as a legacy to his younger friends by the aged President of Magdalen—"Always verify your references." To do so, is not only essential for those who write, but will furnish those who read with a means of obtaining much unexpected enlightenment, and, moreover, a form of sport yielding not merely profit, but diversion.

# PANTHEISM

BY WILLIAM MATTHEWS

## I. PREFATORY.

A FEW words of explanation are required to render the following argument in the form of queries, or, as I have termed it, a "Catechism," intelligible to the reader.

A friend, whom I will name Mr. Montague, like many other young men at the present day, is anxiously brooding over the mysteries of the Universe, and desires to frame for himself a solution which will dissipate at once and for ever all perplexities.

It will hardly be thought surprising that Haeckel's book, *The Riddle of the Universe*, with a title so promising, should seem to afford the very solution required of the great problem. Often have Montague and I held friendly converse in the true Johnsonian sense; for the great Samuel considered there can be no real conversation unless something is discussed. My friend is inclined to accept the Pantheistic conception of God and the Universe as a summary settlement of all difficulties. In truth, if the word "God" is but a label appended to all that is, to earth, sea, stars, man, and to what we call "good" and "evil," what riddle is there for us to unriddle? There can be no contrariety, no collision among impersonal, unconscious forces, simulating intelligence and goodness, and phenomena inconsistent with them; for if Nature is exhaustive of all that is, nothing is left but to be content with *all* that is, *as it is*, and *because it is*.

In terms like these I have gently bantered Montague, reminding him that his deep pondering over the mystery of life must, on his own showing, be "superfluous vapouring." I own the phrase is a little strong, and I am not surprised he should retort :—

"You provoking old fellow! Why will you persist in misrepresenting me? I don't deny God; I believe in God as truly as you do."

"Ah!" said I, "that is well. But haven't I heard you declaim, with a metaphysic shudder, against attributing *personality* to God? What, then, is your Almighty One? Is He, or *it*, only an abstraction—nothing but a quality?"

"Oh!" rejoins Montague, "you must make a distinction. It is not personality that I deny to Deity; that is, not the *essence* of personality, but only its *accidents*."

I reply, "Right; now I begin to see daylight. I propose this: that you favour me by taking pen, ink, and paper, and giving in black and white the meaning of your term 'God,' and what these 'essentials' of His Divine Personality are, as distinguished from its 'accidents.'"

And so it happened that Montague fell in with my proposal, and gave me his definitions; and these I have quoted in his exact words in the questions and replies now appended.

We must be careful, if we wish to show any one that he has involved himself in a series of fallacies, not to assume an attitude too controversial or too combative. What will be the result of showing fight too fiercely but to put him on his mettle, to excite his pugnacity in return, and to hinder rather than to encourage him to reconsider his mental position. I have accordingly in the after-part of these pages imagined myself to be replying in the form of questions, which suggest

instead of directly demonstrating the fallacy of the views I would refute.

I have little doubt that a mode of argument which at first sight looks somewhat indirect will, for the reason assigned, be more effective to a mind in the inquiring stage than conclusions reasoned out with formal precision and expressed with some amount of positive assertion.

II. A CATECHISM.

1. What do you mean by the term "God" ?

I mean "the whole universe, including everything, and man."

2. May I ask how much, *beside man*, you definitely include under this universal term "everything" ?

I include "all activities, forces, energies."

3. As you refer to "God" by the phrase "Him," and "His," and as "acting," I infer that you believe in the existence of a *Being* of some kind so designated. Has this Being any characteristics capable of being discerned and stated ?

Assuredly. The Deity has all the essentials of personality.

4. Will you specify what you consider "the essentials of personality" to be ?

With pleasure. "All the qualities, peculiarities, powers," possessed by "the human unit"; that is, "intelligence," also "will," though not "absolutely free," and "power of choice."

5. Then you mean, I suppose, that our notion of the personality and its essentials of "the human unit" assists us to form a notion of the "essentials" of the personality of God ?

Well, not exactly. "The form of human personality, as we know it, does not pertain to God."

6. Thanks for your definition of terms concerning God —so far as your oscillation of ideas between an abstraction and a real Being renders any definition intelligible. But now, I should like to know what you understand by Evolution?

I understand that process continued through "countless æons of the past, of which the present stage of the universe is the result."

7. What was that process? Among various theories of Evolution, which do you approve?

All that exists, including man's entire personality with all its attributes, was contained potentially "in seeds of the original Kosmos." Thus, Newton's genius, and such intellectual productions as *Macbeth* and *Faust* were parts of the original Kosmos.

8. Pray tell me is that something which you call "God" the cause of these astounding potentialities, and of their far-reaching effects?

We may speak of God as cause only as being a force *inherent in Nature itself*, but not as a Power external to it.

9. You express yourself most clearly. But now, considering that, as you would say, God is not only *in Nature* but that *Nature is God*, and since man is a part of Nature, can there be such a thing as human agency? Is our will a distinct and originating cause of our actions?

As regards human action, "God is the true and the efficient, man only the secondary and instrumental, cause of whatever he accomplishes." Does a man think that he discovered chloroform? No such thing. He is merely an instrument "used by God," who is the true Maker of the product. Like this it is with all good. "Law, State, Church, are but tools of God, means by which He works His inscrutable ends."

10. I begin to feel that your last replies make me dizzy. I hardly know whither you are leading me; whether from Nature to the supernatural, or, by declaring everything to be "natural," to the inference that nothing can be supernatural. These are indeed things which have been kept secret from the fathers since the foundation of the world. I long to know one thing more, if you can tell me. Is Evil an actuality under God's rule—if, indeed, Nature can properly be said to rule? What is God's relation to it?

"Vice is necessary as a contrast or a play-off to Virtue, to give it a meaning which by itself as sole possessor of the field it would not have." The general tendency of the Universe shows virtue to be the ultimate victor over vice. "The stream of tendency flows in the direction of Right."

### III. A PAUSE BEFORE PROCEEDING.

So far, I hope that in the form of question and rejoinder I have made clear the meaning of certain terms in familiar use by some who adopt Theistic words only with all their Theism washed out. It is possible that others beside our friend Montague may get definiteness of idea from this exposition. It is not only desirable but it is imperative that before dealing with any set of propositions there should be no mistake about the precise import of their leading phrases. Especially does this hold true when the name of the Ever Blessed God is concerned, and when by juggling with words His Being is nominally acknowledged but virtually denied. The way is now prepared to add some further questions on the truth or the fallacy of positions maintained in the interest of anti-theistic philosophy. Fairly met, these questions, I submit, can have but one reply.

though that must be left for the reader's candid consideration. It will be easy to evade, to raise false issues, to split imaginary hairs, to blow bubbles indefinitely. But it will be for a reasonable man to reflect calmly whether the implied answers to the questions proposed do not outweigh the objections that might be arranged in opposition.

#### IV. FURTHER QUESTIONS FOR THE READER TO ANSWER FOR HIMSELF.

If the term "God" means everything that exists, must it not include things that are *not conscious* of existing?

If these things, being unconscious, are in *no conscious union* with this existence that you name "God," how can they be parts of His *undivided* personality?

Is it not competent for a mind to distinguish between its own identity and something else not included in that conscious identity?

If a mind can make this distinction, is there not a real difference in kind between this perceiving mind and objects external to its perception? But if there is no real difference between the things perceived and the mind which is cognizant of them, how can we speak of mind as possessing distinctive "characteristics," or as being a true existence in itself?

If by the phrase "God" you mean only a *collective* epithet for the totality of phenomena, conscious and unconscious, intelligent and unintelligent—that is, Nature—is it not a mockery to call this conglomerate *God*, as if it were the Omnipotent Deity and the Supreme Causal Will?

If we give the name "God" to all that is, is not *everything the same*, because it is God? And is not God

the same, by being everything? Now, as all sorts of things *are not the same*—for instance, good and evil, living and lifeless, intelligence and unintelligence—how can God be the same, one term being common to them all? Do many incoherencies make up one coherent?

If “God” and the “universe” are merely different expressions for one and the same identity, and if there is no God irrespective of Nature, why say “I believe in God”? Why not, rather, “I believe in nothing, except in things in general”?

Is it not perplexing to ascribe to God, first, “intelligence,” “choice,” “will,” all qualities of the “human unit,” and secondly, to assert that human personality as we know it does not pertain to God? From whence, then, are we to derive a notion of the “essential” of personality if not from our own? Why play fast and loose with your own terms, talking one minute like a Pantheist, then like a Theist, then very like an Agnostic?

Since Theism and Atheism have each explicit arguments of affirmation and of denial, each, therefore, has a basis of proof and of disproof of their respective doctrines. But what direct argument in its favour as a middle term, and what definite proposition and direct proof, can Pantheism afford? How does it account for the orderly, combined with the apparently disorderly, phenomena of Nature? Or how does it account for Nature at all, in any more satisfying way than sheer blank Atheism?

What “demonstrations” of Evolution are forthcoming that prove it has advanced from the region of hypothesis to that of fact? To constitute scientific proof, must not such proof be founded on experiment and verification?

As experiment and verification in regard to “Kosmic

seeds," or to "Kosmic vapour" (such is Mr. Huxley's phrase), is impossible, how is it proposed to verify Evolution? Is it by attributing Nature's method *now* to Nature's method in the *past*?

Suppose it so. What, then, do we know of Nature in the *remotest past*? Is it not certain that life at one time did not exist in the material universe? Was not the nebula, or "Kosmic vapour," a vast fire-mist, rendering life impossible? Next, what do we know of Nature *now*? Is it proved that organic life is derived from inorganic matter? Does not life appear only from antecedent life? If the latter proposition holds good, and not the former, how is Evolution "demonstrated"? Is not Evolution at present undergoing collapse?

What is implied on Pantheistic principles by "Virtue," "Vice," "Good," "Evil"? If nothing is intrinsically right or wrong, good or evil, but is only apparently or relatively so according to men's partial apprehension, what can you mean beyond mere sounds in calling anything by those names? If "God" is but another phrase for "Nature," where is *the seat* in the universe of any moral responsibility for good or for evil? In fact, can there be such a thing as moral rectitude, or "morals" whatever? What *problem* is there to solve, when wrong and oppression in some fierce carnival make humanity their sport? Might you not as well praise or blame the regularity or the catastrophes of an engine-room, as feel one single generous glow of rapture or throe of indignation at the vicissitudes of victorious virtue or of audacious wickedness in your Godless Universe?

And permit me to inquire further whether it does not follow that some astounding conclusions must result from your (pardon the expression) eccentric

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observations on chloroform? If no one, Pantheistically speaking, "invents anything"; if "God," that is, "Nature," is the only true inventor; further, if Law, State, and Church are but "tools of God"; if Newton's genius, and *Macbeth* and *Faust*, are but the residual deposit of "Kosmic seed"—is not man a mechanism only, a vivified automaton, and *not a person*? If thought is a property of matter, why not propose to abolish the study of Mental Philosophy? Why not dub Psychology, "Physiology in a mist"?

Another step. Human personality having been evaporated, how can you attribute personality, in any intelligible sense, to God? If "Nature" and "God" are equivalent terms, and if there is no God apart from Nature, and as Nature as one whole is impersonal, are you not pitchforked upon a "no man's land"? In other words, must you not accept this ridiculous conclusion: that there is neither a truly Divine, nor a truly human, personality?—in short, that there is no such entity as a *person* in the universe?

What, and where, are we now? Does it not look like this: that we are inappreciable atoms, whirled by an unknown, an unknowable, a mindless, impersonal, mechanic force to nowhere? The thing we name "man," on this showing, what is he, or it, but a bubble, a desolation?

Why not revert to the theory of *the eternity of the universe*, and make something of that? Would it not save no slight botheration? What need to theorize about the origin of things if they never had an origin, but were what they are from eternity? Why speculate on the creation of the world, or on "how the world was created," if its eternal existence precludes the necessity of a

Creation and of a Creator? If all things existed from eternity, which has to be accounted for? If the universe is eternal, what is that but to say that it did not require a cause, since it did not need initiation? Why rack the brain for a Pantheistic Cosmogony? Is it not superfluous to essay the composition of a new Book of Genesis?

#### V. CONFIRMATORY.

It is not improbable that some one upon reflecting on the ideas I have shaped in the form of question and reply, may suspect me of attributing conceptions to my friend too unreasonable to have been entertained either by him or, indeed, by any one else, and so of getting cheap credit for triumphant retort by the device of cross-examining posers. Yet the truth is that I have attributed no sentiment, however peculiar, which has not been expounded with due acumen and philosophic sedateness by "potent, grave, and reverend signiors" of that particular school of thought. It will, therefore, I think, be fitting that I should close with some observations from authors well qualified to delineate the nature and tendency of Pantheistic speculations. It is always desirable to go back, if we can, to the originating mind of an error, the man who first gave it coherence, shape, and symmetry. It is a fact that this masquerading with the name of "God," as a cover to the practical denial of His existence, finds its most celebrated exponent in Spinoza, the real founder of Pantheism; understanding by Pantheism, not its actual theoretic origination, but rather the condensation of the idea by Spinoza from a fluctuating, cloudy, indeterminate phase, an "airy nothing," to "a local habitation and a name." The idea of God, according

to Spinoza, is entirely a product of Geometry and Metaphysics.

But let others speak. It will be obvious that the writers to be quoted agree in understanding the Pantheism of Spinoza to teach : (1) that Nature alone exhausts the whole of existence, and that there is nothing beyond or prior to it ; (2) that "God" is but another name for an impersonal, necessary automatism ; (3) that there is no distinction between good and evil, right and wrong, and that there is no such thing as sinning against God ; (4) that the human mind has no rational, personal, self-conscious existence after death ; (5) such being the principles developed out of the Pantheism of Spinoza, it involves no injustice to his memory to class him with Atheists.

Epitome of Spinoza's system by the Rev. Michael Maher, S.J., *Psychology, Empirical and Rational*, 4th edition :—

" His system is elaborated in his chief work, *The Ethica*, in geometric fashion from a few definitions and axioms. *Substance* is ' that which exists in itself, *i.e.*, the conception of which can be formed without the aid of the conception of anything else.' . . . Every particular existence is only a modification, an individualization, of the universal substance. Neither human souls, nor material objects, are self-subsistent ; they are merely transitory modes, or as recent writers say, ' aspects ' of the one infinite being. This one eternal, absolute substance is God. This God is the immanent, indwelling, self-evolving cause of the totality of things. It is neither intelligent nor free. God and the universe differ merely as *natura naturans* and *natura naturata*. The Divine substance evolves itself according to the inner necessity of its being, and this is the only ' freedom ' which it possesses. The laws of Nature are absolutely

immutable. They proceed from the essence of God with the same necessity as its geometrical properties flow from the essence of the circle or triangle. Divine action is not in view of ends ; there are no final causes" (p. 260, &c.).

"The supposed freedom of the human will is an illusion. 'Men,' says Spinoza, 'deceive themselves in thinking that they are free. The idea which men form of their liberty arises from this, that they do not know the causes of their actions.' The soul is the 'idea'—the subjective aspect—of the body. Both are merely modes or phases of the Divine substance. . . . *Good* is that which is useful to human well-being ; *evil* is the reverse. Since the soul is merely an aspect of the body, immortality in the form of continuity of personal life, after the dissolution of the body, is of course impossible. The individual will be reabsorbed in the omnivorous infinite substance. We are only 'tiny wavelets on the great ocean of substance ; we roll our little course, and sink to rise no more'" (p. 261).

"Spinoza's theory is entirely built up out of his definitions and axioms, and these have been shown to be inaccurate and untenable by many writers. . . . The identification of God with blind, necessarily all-evolving, all-devouring substance is little, if at all preferable to bald, naked atheism. The fatalism involved in the system is subversive of the notions of responsibility, merit, duty, and sin, good and evil, together with all moral ideas. Finally, the belief of mankind in a future life is an idle dream" (p. 261).

Essay on the *Latest Form of Infidelity*, in *Tracts on Christianity*, by Andrews Norton, formerly Professor of Sacred History, Harvard University :—

“ It is asserted, apparently on good authority, that Spinoza composed the work in which his opinions are most fully unfolded in the Dutch language, and committed it to his friend the physician Meyer to translate into Latin ; that where the name *God* now appears Spinoza had written *Nature*, but that Meyer induced him to substitute the former word for the latter in order partially to screen himself from the odium to which he might be exposed (Le Clerc's *Bibliothèque Ancienne et Moderne*, tom. xv., p. 433. tom. xxii., p. 135). This account, which Le Clerc says was given him in writing by a man worthy of credit, is confirmed, not merely by the whole tenor of Spinoza's system, but by his use of the words ‘God’ and ‘Nature’ as interchangeable. Thus, he says in his preface to the fourth part of his *Ethics*, ‘we have shown in the appendix to the first part that Nature does not act for any end. For that eternal Being which we call God, or Nature, acts by the same necessity by which it exists. The reason, therefore, or cause, why God, or Nature, acts, and why it exists, is one and the same. As it exists for no end, so it acts for no end’ ” (p. 239, &c.).

*A Study of Spinoza*, by Dr. Garnett :—

“ The identification of Nature, Substance, and God settled at a very early date the fundamental doctrine that nothing was possible except the actual. The general belief that the contents of the Universe might have been other than they are assumes that they came from a Source of wider range than themselves—the finite from the Infinite. If, however, Nature is infinite and complete, no scope is left for other than it ; and if God is simply the common ground of all things, Reality and He are one, and leave no margin over to either. As all that is in Nature has its ground in God, so must all of which God is the

ground be found in Nature. . . . This co-extension of God and the world leaves nothing which transcends the actual, and turns all the actual into the necessary. . . . All that is, must be ; and nothing can be, but what is" (p. 172).

"The moment Spinoza had, to his own satisfaction, identified Nature, God, and Substance, he would have done well to select the term which he preferred, to the exclusion of others. If a modern man of science believed himself to have alighted on the ultimate principle of phenomena—be it protoplasm or some proto-dynamic polarity—he would mark it by an invariable name. Should it have been previously known in some of its disguises, and called now this, now that, without suspicion of its universal function, he might perhaps choose one of its existing designations ; but having chosen it, would certainly not keep wandering about among them all. But Spinoza, maintaining in use several terms for the same subject, virtually neutralizes the equivalence which he has established among them, and reopens questions which his philosophy completely shuts up" (p. 173).

"Spinoza makes it a merit of his philosophy that it treats the human mind as 'a kind of spiritual automaton.' Not only does the remark apply to the total Thinking attribute of the Universe, but his whole theory of God exactly presents, in its principle of parallelism, the modern doctrine of automatism" (p. 342).

"He is conscious of the resistance which he must expect from the prevalent belief in Creative and Providential design, and makes efforts more strenuous than patient to break it down. . . . Nature acts because it exists, and as it exists, and can no more *do* anything different than *be* anything different. It has no alterna-

tives ; it knows no degrees of comparison, of better or worse ; no antithesis, of true and false, of right and wrong ; but subsists exclusively in the positive and determinate. . . . The estimates of good and evil, of beauty and deformity, of order and confusion, are wholly relative to our finite constitution, and have no meaning for the world as a whole" (p. 343).

"It is a human inaccuracy, Spinoza says, to speak of 'sins against God' ; they are *against* nothing, if by that is meant any positive antithesis to other positive being ; but are only cases of imperfect conformity with an arbitrary expectation of ours that every individual, in the shape and with the definition of man, will be and do what we deem suitable to that type. Drop the preconception of the type, and the very same things that offend us in men please and amuse us—as the fighting of bees, and the jealousy of doves" (p. 263).

"This surrender of all things to unlimited Nature-powers, unguided by Ideas, is at once a reproduction of Lucretius and an anticipation of Haeckel, and identifies Spinoza's relation to Theism with theirs (p. 344). . . . 'The conception of *God*,' says Kant, 'is generally understood to involve, not merely a blindly operating Nature as the eternal root of things, but a Supreme Being that shall be the Author of all things by free and understanding action ; and it is this conception which alone has any interest for us.' And he who has it (Kant adds), is properly called a 'Theist' in virtue of his belief in a 'Living God'" (p. 332).

"If we adhere to Kant's interpretation of the word 'God,' it is impossible to claim Spinoza as a Theist, or even as a Pantheist ; for neither as 'Immanent,' nor as 'Transitive' and Creative, did he acknowledge

‘a Supreme Being the Author of all things by free and understanding action.’ By this criterion Jacobi was certainly justified in classing him with Atheists. . . . As there are and always have been people who believe, so there are and always have been people who disbelieve the governance of the world by a ‘Living God’; and we cannot dispense with a name for each. The duty of applying to no one a term which he disowns is conditioned on his not altering its meaning in order to disown it; the obligation is reciprocal, resting on a common understanding, and violated by tricks of perversion on either side. . . . It is no valid disclaimer to say, ‘I am not an Atheist, for I believe in a First Cause,’ if that first cause should happen to be hydrogen, or other blind element of things. It cannot be desirable that the word ‘God’ should be thrown into the crucible of metaphysics, and reserved for any *caput mortuum* that may be left, when the essential constituents of its meaning have been dissipated” (p. 347).

# REASON AND INSTINCT

BY THE REV. P. M. NORTHCOTE

I HAVE not infrequently been confronted with the opinion that the animal creation, inferior to man, is endowed, like him, with the power of reason, similar in kind although in a less developed state. In many instances to the persons who put forward this opinion I might justly have applied the dictum of the philosopher, "*qui ad pauca respiciunt de facili pronuntiant*" (those who know but little pronounce readily); in the cases of others, however, their conclusion was evidently the result of attentive observation and more careful thought.

I must prelude my disquisition on the subject by saying that with this opinion I am wholly at variance, nor have I ever seen, heard, or read of any instance of animal sagacity which could persuade me to alter my conviction.

Any example which may be brought forward in support of a theory of this kind must, of course, be rigorously well-attested and absolutely veracious; moreover, to be of value it must be drawn from the actions of animals in a state of nature, or if domesticated at least not acting under the influence of the trainer. In the case of performing animals, there is a

strong presumption that their feats are the result of a certain subtle mesmeric power, which I have known some men to possess in an extraordinary degree over the inferior creatures. At any rate a new element enters in which would invalidate any examples taken from this source ; although, even if admitted, I doubt if anything could be adduced which would unquestionably show that such action was the outcome of reason. If so, it would yet have to be demonstrated that the animal was acting on its own initiative, and not merely recording the impress of its trainer's will. So we must exclude this class of example from our inquiry.

One of the chief elements of any argument is the definition of your subject. And I think that the cause of so much confusion and error in this as in many another question, is because persons have not formulated to themselves an exact conception of the meaning of the terms they use ; we must therefore first of all clearly define what we understand by "reason" and what by "instinct."

Another point that we must be careful to bear in mind is that not all our actions are the outcome of reason, but very often we act on the impulse of the moment without any deliberation whatsoever ; in such cases we are obeying an instinct and not acting upon reason. When we instinctively start aside to avoid a falling piece of timber, we do not stop to reason upon our action, but we obey promptly and unhesitatingly the instinct of self-preservation. We have, therefore, certain instincts in common with the lower animals, but we have something else besides, namely, the power of reason. We must clearly bear in mind that we too have animal

instincts, for this will greatly help us in our inquiry "Have the lower animals also got reasoning powers?"

First of all let us ask ourselves the question, What is reason? We may give the answer which all logicians have given, at least in substance if not in so many words, that it is "the discourse of the human mind, proceeding from universal principles." Two points must especially be noticed in this definition, namely, that it is a discursive faculty, and not intuitive; and secondly, that its exercise is always based on universal principles, which either we know intuitively, or else have established beyond question by reasoning downwards from superior principles, or by the induction of them from particular facts which have fallen under our observation. But even in this case the induction of a universal principle from the observation of particular facts had its basis in a principle more universal still, which was self-evident to our understanding. These few universals which, being self-evident, are incapable of proof we call the *first principles* of reason, and upon them all subsequent reasoning is based. Let me illustrate this: a chemist analyses a pint of water, finding as a result that it resolves into two volumes of hydrogen and one volume of oxygen; again, he takes a quart of the same liquid, submits it to a similar process, with the result as before, that he finds the quart, equally with the pint, to be composed of hydrogen and oxygen in the proportion of two to one. He may repeat the process with any quantity of water, small or great, and he will invariably arrive at the same result. Now, mark the action of his reason: the pint, the quart, the gallon of water were all particular things perceptible to

his senses, but from the examination of them he has arrived at a universal conclusion which his senses could never have attained to; he has discovered the *nature of water*, and now he is able to say that all water is composed of hydrogen and oxygen in the proportion of two to one. We see, then, that the chemist has a faculty which is superior to the senses, an immaterial faculty; for his senses, whether exterior, as the sight, touch, and so forth, or interior, as the imagination, the sensitive memory, &c., being material are only capable of recording particular objects, of perceiving particular sensations, but he has arrived at a universal principle, "the nature of water." In the possession of the reasonable mind this principle is not barren, but it forms a solid groundwork from which new deductions may be made. And so we go on always conquering fresh fields of knowledge. What, however, was that great underlying first principle rooted in the chemist's mind, which prompted him to embark on his experiments? It was a principle known to him by intuition, a principle which he could not prove, but which his intelligent nature received immediately as self-evident, namely, that "nothing exists without a sufficient reason for its existence," or, to put it otherwise, when we speak of things created, that "there is no effect without a cause." The causes of a thing are fourfold: the efficient cause, the material cause, the formal cause, and the final cause. When we thoroughly understand all these causes of anything that exists, then we have arrived at as perfect a knowledge of that thing as it is possible for us to obtain. So the chemist knows about water that the matter of which it is composed are the

gases hydrogen and oxygen in certain definite proportions, the efficient cause required to effect their combination is a spark, and now the matter which before existed under the forms of hydrogen and oxygen, exists under the form of water.<sup>1</sup>

No discoverer would ever have taken in hand investigations into the secrets of nature had not his mind been furnished originally with this great first principle that "nothing exists without a sufficient reason for its existence," or otherwise, "no effect without a cause." Friar Bacon watched the lid of his kettle bobbing up and down : would it ever have occurred to him to ask himself why was this, had it not been that this great first principle, the basis of every discovery, was ineradicably planted in his mind ? Was it not the same principle which caused Newton to draw such momentous conclusions from the falling of an apple ?

Or again, a more universal principle still is this, that "a thing cannot at the same time be and not be." It is obvious that we should never trouble ourselves about the relations between cause and effect, nor indeed make any mental act whatsoever, were we not intuitively cognizant of this principle.

Let us take another example of a beautiful exercise of reason, namely, the dilemma : Whensoever we reduce our opponent to silence by an irresistible dilemma, it is because firmly fixed in the minds of us both is the principle that "the two sides of a contradiction cannot at

<sup>1</sup> The old peripatetic doctrine is that all material things have one common basis, which they call "*materia prima*," and which is potentially receptive of all the different forms of material existence, organic or inorganic. But into the subtleties of this doctrine we do not now propose to enter.

the same time be verified." For example, to one who professes belief in the Christian revelation, yet picks and chooses from it just so much as suits his fancy, I would propose this dilemma: "If the gospel of Jesus Christ is a revelation from God, why do you not accept it in its entirety? If it is not a revelation from God, what grounds have you for faith in any part of it?" Here we see the two sides of a contradiction: the gospel is either a revelation from God, or it is not; one or other side of the contradiction *must* of necessity be true. If it is a genuine revelation we must accept it wholly, but if not we can have no *faith* in any part. Thus I force my opponent to be a genuine Christian, or openly to acknowledge himself an unbeliever. Could this argument have any weight were it not for the first principle rooted in every human intelligence, that the opposite sides of a contradiction cannot simultaneously be verified?

You might take any instance of the exercise of our reasoning powers, and you will find that immediately or remotely it is based on a universal principle intuitively apprehended by the mind.

It is precisely in the power to grasp and make an intelligent use of universals that we perceive the spiritual and consequently immortal nature of the human soul. Whatsoever the senses perceive is always something single and particular. Mine eye beholds a red rose: that particular flower is presented to my sense of sight, but the eye will never of itself have a universal conception of the nature of roses irrespective of colour and shape. Mine ear is delighted with an exquisite piece of music: it alone

will tell me nothing about the laws of harmony, nor is it able to grasp the universal conception of the nature of sound. My imagination will conjure up the figure of a man, hear his words, portray his actions, but it will not answer for me the question, What is human nature in the universal? The imagination is the noblest of the sensitive faculties, yet it is obvious that it will only represent one set of images at a time: if we would conjure up another set of images we must exclude the former, simply because the imagination is exercised through a material organ of the brain, and consequently can only represent concrete, singular, and material objects; it can never represent what is immaterial and universal. Just as the senses cannot obtain a grasp of any universal conception, so obviously they can never deduce an intelligent conclusion from universals; we must first have an intelligent grasp of the law of optics before we are able to make a telescope or a microscope. We conclude, therefore, that man has within him something higher than mere sensitive nature, a spiritual intelligence capable of apprehending and making use of universals; being spiritual it is liable to no destruction short of sheer annihilation, and is therefore an immortal unit. Matter is never annihilated, it decomposes, passing from change to change; but the spiritual is incapable of decomposition, being a simple nature not composed of jarring and contrary elements, it cannot therefore cease to be except by annihilation; that is to say, by the Creator subtracting from it the existence He once has given. Natural philosophy teaches us that this is done in no instance coming under our

knowledge, we therefore rationally conclude that He will never withdraw the "esse" of existence once imparted to the spiritual nature that has once come forth from the inexhaustible reservoir of the Divine Ideas.

We must now speak about animal instinct. So unerring is this instinct, so marvellous the sagacity founded thereon, that it is small wonder that even thoughtful persons have been found to attribute to the inferior creatures a certain measure of rudimentary reasoning powers.

We may define instinct as being "the principle of brute action founded on the sensitive perceptions." Without doubt both the brutes and ourselves possess this faculty of instinct, for my dog and myself will equally shrink from contact with a hot iron the moment we perceive that it burns us, without either of us stopping to reflect why we do so. The only question at issue is whether the brute creation has also, in an elementary way, that higher faculty, which I have demonstrated to be resident in man, namely, action resulting from the intelligent grasp of universal principles. We cannot solve this question except by a close observation of the manner of life amongst the birds and beasts; there is no other way of arriving at a conclusion. If it can be demonstrated in this way, by observing their mode of action, that the brute animals proceed to what they do from an intelligent grasp of universal principles, then indeed it is made clear that they possess the reasoning faculty in common with ourselves. They would be upon the same plane with us: to take their life would be almost equiva-

lent to murder, and to feed upon them little short of cannibalism.

All action tends towards some end, and since nature is the intrinsic principle of action, it follows that as there are different natures each adapted to some special end, so the actions which creatures in the different orders of nature elicit will be of a kind proportioned to bring them to their destined end. An intelligent nature proposes its end to itself and selects the means which appear to it to be best fitted for the attainment of that end. An unintelligent nature being incapable of proposing to itself an end, must have its proper end constituted for it by the Author of nature, Who will also furnish it with all the powers necessary for the attainment of that end.

As far as natural philosophy goes—since we do not intend for our argument to take into consideration what faith teaches us concerning the resurrection of the body—all material sensation ceases with physical death. Sensation is recorded through material organs, when death deprives these of their power of perceiving external objects then sensation ceases. We need no proof of this, for experience teaches us that a corpse is absolutely devoid of sense—it neither sees, nor hears, nor feels; wherefore we conclude that the operations of sense have an end which terminates with the period of mortal life.

Four things are necessary to a being endowed with sensitive, mortal existence; they are:—

1. Its conservation during the term of its natural existence in time.

2. A measure of enjoyment proportioned to its power of receiving delight.

3. The propagation of its species: for the unit passes away but the species abides.

4. A certain sensitive attachment to persons and things in some way beneficially connected with itself, and an aversion from those that are harmful.

In the performance of these four things it achieves its last end, which is to give glory by actions suited to its nature to the Infinite Author of its existence.

Instinct, therefore, which is founded upon the perceptions of sense, will go as far as this and no further.

Let us take a glance at these points. First, then, there is the unit's own conservation in life. In order to this it must have a natural propensity to seek those kinds of nourishment which are conducive to health and to avoid those that are noxious; to select environments adapted to its structure and constitution: to avoid or repel its natural enemies; in general, to seek what is conducive to, and to eschew what is adverse to, the prolongation of its natural term of existence. In these matters we perceive that instinct provides sensitive nature with the finest perceptions. Take a town-bred man, in whom the natural instincts have become blunted by desuetude, or rather have been turned into another channel, place him in the centre of a great primeval forest to subsist for a week on such roots and berries as he can procure: will he distinguish between the wholesome and the poisonous with the same unerring instinct which guides the monkey? Will he select healthy localities, distinguishing them from the unhealthy, as surely

as the goat will seek the mountain-side and the buffalo find out the low-lying marshes? Will he discern between dangerous and harmless animals as readily as the sheep will flee from the wolf and herd with the deer?

We notice the same with regard to animals reared in captivity: they have acquired, it is true, many amiable characteristics foreign to them in their wild state, but, as is the inevitable result of slavery, they have in a great measure lost their self-dependence; having always been provided for and protected, their natural powers of resource have deteriorated, and if let loose they will in all probability either die of starvation or fall an easy prey to the first natural enemy which comes along. The perceptions of sense have been diverted from a natural into an artificial channel, with the consequence that Nature revenges herself by depriving them to some extent of their former endowments. They have ceased to depend on themselves, and have learned to lean upon others for all their bodily requirements; but for all that we do not perceive that they have come one step nearer to the apprehension of universal principles whereon reason is based, which would have taught them some means of supplying the wants of those instincts, once so acute but now deadened by long disuse.

Sometimes it happens that two different instincts will come in conflict one with another; then we see in the animal a hesitation very similar in outward appearance to the indecision of a reasoner hovering between two opinions, both of which have in them an element of probability.

For example, a dog will conceive a strong sensitive affection for his master and will follow him everywhere ; if, however, the same dog has a rooted aversion to cold water, should the master cross a stream you will see the dog whine and hesitate on the bank until the pressure on one side of instinct predominates over the other, and it plunges in to follow him : we trace the hesitation on either side to a sensitive instinct, the one impelling the other repelling. How different is the hesitancy of the reasoner, who is sure enough of the universal principle on which he works, but cannot see its application in some remote conclusion. The first principle of the man of commerce is "to buy in a cheap market and sell in a dear one"—that is clear enough, and on it every commercial enterprise is based ; yet when it comes to a particular application, you may see the merchant in great perplexity as to whether he had better make a venture in coal or in cotton, he must calculate profit and loss, weigh the probable chances of fluctuation in the market, ere he can lay out his capital to the best advantage.

It sometimes happens that this conflict of instincts is an occasion of loss to the individual but of gain to the species ; the males of many kinds of animals will fight to the death at breeding time—the weaker loses his life, but the species is thereby the gainer, inasmuch as propagation proceeds from the strongest. Here we perceive that the amative propensities have prevailed over the instinct of self-preservation. In either case, however, the principle of action is sensitive and particular. The two stags which fought for the lordship of the herd did not do so because they apprehended

intellectually the universal principle that it is good for a species that its propagation should proceed from the strongest, it was simply that the sensual inclinations aroused their combative qualities, which got the better of the creature's natural instinct to preserve its own life ; and thus they performed by nature what the stock-breeder achieves by art, who emasculates the less perfect males, leaving the more perfect to carry on the breed.

In some respects instinct has the advantage over reason, for it is prompt and unerring ; the senses immediately record the impression of their proper object, and if the organism is healthy and the object properly presented to them, they record it with unerring sureness. Reason, on the other hand, works slowly from its principles, proceeding step by step as one truth after another is apprehended, while the more remote our conclusion is from the principle on which it is based, the less certain do we feel that we have worked out our problem correctly. Could we see all that is included in the human knowable, in the same manner that the senses apprehend their object or the intellect perceives its first principles, then our knowledge would be intuitive altogether, our understanding would be on a par with what theology teaches us about the pure intelligence of the angelic spirits. Still, between intellect and sense, reason and instinct, this difference is always discernible, that the one has a grasp of universals while the perceptions of the other deal with single objects.

You may train instinct just as you may train reason, and in their own degree there is as much difference

between the natural sagacity of the wild animal and the trained sagacity of the shepherd's dog, as there is between the intelligence of the rustic and the intelligence of the man of science ; yet the essential difference always abides—the one is cultivated, sensitive perception, the other is reason cultivated so that it can draw accurate conclusions from those universal conceptions to the apprehension of which the senses can never attain.

The more thoroughly we institute a comparison between man and the inferior animals, the more surely are we obliged to recognise that he has within him a faculty which they have not ; he has senses and the instincts inherent to sense the same as they have, but in him they perform a function unknown to the lower creation ; they supply matter to that faculty of his nature which is capable of abstracting from the objects perceived by sense, eternal, universal, and immutable truth—a sure indication that this faculty is spiritual and immaterial, because it is capable of what sense is wholly incapable. The human soul, therefore, in which this sublime faculty is radicated must itself be spiritual, immaterial, immortal ; for if it is certain that the effect cannot exceed the power of the cause which produces it, so it is certain that immaterial operations cannot proceed from any but an immaterial substance.

Now compare, for instance, the maternal instinct of the brutes with the rational love of a human mother. The affection of the female bird or beast for its young is indeed beautiful beyond words, yet it only lasts for as long as the little creatures are unable to fend for themselves ; when they are grown up the maternal

affection for them ceases, and the mother will drive them roughly from her as though she had no further interest in them. The maternal instinct had a particular mission to fulfil, when that was over there was no further use for it, and Nature withdrew her inspiration. Not so the mother-love of the woman : it extends through the whole of life, it will bridge over the gulf of death, and stretches out with undiminished love and longing into the ocean of eternity, simply because it is the love of a spiritual soul which is not bound down to the limits of time and space, but which tends towards the universal, the infinite, the eternal.

Or again, the dog will conceive the strongest and most constant devotion to its master. Yet the principle on which it rests is purely sensitive : no dog ever yet recognized any man for its lawful master with whom it has not come into sensible contact ; if he leaves others to feed it, takes no notice of and neglects it, he may be its master by every title, but he will never attach it to him. There is only one way of winning its affections, and that is through its senses, just as you can only master it and make it obey you by making it feel through its sensitive perceptions that you have the upper hand.

Once, however, this mastery has been asserted, then indeed nothing will detach the dog from its subjection to its master, not blows, nor harshness, nor ill-treatment. And in truth marvellous are the instances of canine devotion even to a cruel master. Yet through it all you can detect nothing that may not be reduced to the perceptions of sense, the sound of words, the tone of the voice, the glance of the eye, all of which are

indelibly impressed on the animal's imagination and recorded in its sensitive memory.

Compare this with the unswerving fidelity of a staunch royalist to an ungrateful king. Justinian treated Belisarius with constant ingratitude, neglect, and mistrust, yet the great soldier, who might have played the part of a king-maker if he would, remained faithful to the fortunes of Justinian with an unshaken and unshakable constancy. His unfaltering loyalty withstood every test because it was founded on an immovable basis, the political axiom "*a Deo rex, a rege lex,*" the first principle of all monarchical institutions, which was to him a universal axiom of government immutably true, and consequently no amount of ill-treatment or neglect could destroy his loyalty to the Emperor his master. Why! a staunch royalist will die for the royal master whom he has never seen. Would a dog do this?

If, furthermore, we regard the devices which man constructs, comparing them with the works of the brute creation, we see operative the same two distinct principles of action, the instincts of sense tied down to what is particular and definite; on the other hand reason, which, basing its conclusions on universal conceptions, is consequently capable of constant variety and continual improvement. In its own particular domain instinct will turn out better work than reason; no artificer could construct a honeycomb, or make a bottle-tit's nest, or weave a web, so perfectly beautiful as can the bee, the tit, or the spider. Man can and does imitate by art these works of Nature, if he can obtain the necessary material, but his most skilful

imitation is far inferior in symmetry and finish to the exquisite beauty of Nature's handiwork. Nevertheless, man, as he unfolds the secrets of Nature, and steadily advances from one truth apprehended to another before unknown, is able to compare and improve, and to induce in the execution of his designs a perpetual variety. Whereas what the bird or beast does to-day is essentially similar to what the same species performed a thousand years ago: the swallows have built their nests for centuries upon the Arch of Constantine, they are precisely of the same design as they were when first it was erected, but mankind has conceived many and various forms of arch since then. They worked according to the particular instinct which God implanted in them from the beginning, but man has drawn continually new devices from the universal principles of reason.

As I have said, there is no possible way of discovering the source of a creature's actions except by observing how it acts; for our understanding is not of the intuitive kind which sees directly into the essence of a thing, but we observe and draw conclusions, making use of those universals with which the mind is furnished as a basis for the discourse of reason. There are certain actions of animal nature which at first sight might lead us to think that the brutes possess a rudimentary grasp of universals. A cat gets to know by experience that fire imparts a pleasurable sense of warmth, but should a burning brand happen to fall upon it, ever afterwards it will start away the moment there is a stir in the grate. Has it not, therefore, apprehended certain universal principles,

namely, "all fire warms," "all fire burns"? A short consideration shows us that it is sense, not reason, which is responsible for its behaviour. The sense of touch has shown it that a fire will warm, and also burn if incautiously approached; the sensitive memory retains the impression. When, therefore, the eye beholds a fire, the particular pleasure or pain it has once experienced is brought back to it, and it will act accordingly. I suppose there is no beast more sagacious than a monkey; he too will warm himself at the fire, or flee from it if he fears being burned. But it is evident that he has no intellectual grasp, however elementary, of the nature of the fire, for he will not do what the most savage tribe of men will do, namely, put it to intelligent uses, such as the cooking of his food or working havoc upon his enemies. He will not maintain a fire once lit by supplying it with fuel, because he has no conception of "inflammable substance" any more than he has of the nature of fire itself; both are universal ideas, and therefore hopelessly beyond the reach of his sensitive perceptions. He will play with a lighted brand upon a thatched roof, utterly unconscious of the danger to himself and the inmates of the hut; should a spark burn him he will instantly drop the fire-brand upon the straw, and perhaps pay for his diversion with his life.

Animal sagacity founded upon instinct is, indeed, oftentimes so marvellous, that it is small wonder that even intelligent persons are sometimes deceived into the idea that it is an exhibition of rudimentary reasoning powers. But they must bear in mind that solitary and exceptional examples are insufficient proof, for

such may be the result of some coincidence, or some higher law which baffles all calculation may have temporarily crossed the normal law of nature and produced the unwonted phenomena. We cannot conclude that the ass is a reasonable animal because Balaam's ass spoke. An animal trait must be shown to be racial, not individual alone, before it can be put forward as a proof. I do not argue that men are rational because one man is able to construct an equilateral triangle, but because all men whatsoever are able to do so once they have apprehended these two universals : the definition of a circle, and the axiom that things that are equal to the same thing are equal to one another.

When some trait of the brute creation has been shown to be racial and not individual, it remains further to be demonstrated that it is an action which could only proceed from the intelligent grasp of a universal principle, otherwise the theory of reason existing in the brute creation has not been advanced one jot. Without such an example the case for the animals remains at best non-proven ; it is baseless conjecture, nothing more. If there be any such example, we can only say that we have never seen it recorded.

The fact that man sometimes degrades himself below the level of the brutes is only another proof of his essential superiority. Instinct keeps the brute on a well-defined level ; it has a certain latitude of its own, but outside that, as the brute does not rise above it, so he does not fall below it ; but reason, acting under the light of universals, is free to choose the highest or the lowest. That the great mystery of sin is not to be

found in the lower creation shows us clearly that their non-intelligent nature cannot be raised to supernatural heights or sink to supernatural depths.

It is hard to distinguish exactly the border-line which separates vegetable from animal life, but the difference between even the lowest race of men and the highest species of animal is clearly marked, for we see in mankind the power to grasp and make intelligent use of universal ideas ; no such power can be shown to exist in the brutes ; the consequence is that the comparatively feeble and defenceless biped is able by his ingenuity to cope with, overcome, and reduce to subjection the strongest and most crafty animals of the brute creation.

There are races of men which appear to be quite, or almost, stationary as regards intellectual development when left to themselves ; they seem to be somehow wanting in that power of initiative which is the note of a progressive race. Nevertheless, those very peoples who have remained at a standstill for centuries, are shown to be capable of imbibing new ideas when under the instruction of a superior stock. Witness the native races of South Africa : not long since they showed only the rudimentary intelligence of a savage people, a people who used their intelligence merely for the purposes of obtaining and preparing food, waging warfare, and all the other things constituting the elementary manner of life which denotes the sheer barbarian. Now they are developing into craftsmen, agriculturists, political agitators, and even students of the more liberal arts. Could any race of beasts be raised so high in so short a time ? Never ! for the soul of the beast has in it no faculty for apprehending universal ideas. If they

have, in what do they reveal it? The most highly-developed animal sagacity affords no real proof of what is transparently evident in the actions of the least cultivated races of men, namely, an intelligent grasp of universal ideas. The vast majority of the greatest thinkers of every age concur, therefore, in placing man in a scale of existence essentially higher than any other terrestrial being.

Two corollaries follow upon the conclusions we have here deduced. The first is that we cannot have friendship, properly speaking, with the lower creation, for the very idea of friendship implies some sort of equality, the interchange of kindly offices between beings of the same order. We may be fond of the birds and beasts, they may entertain our leisure moments, they afford copious matter for reflection on the glories of the great Creator; any wanton cruelty towards them is the sign of a character low, cowardly, and pitiless. Still, friendship with them, in the strict sense of the word, we cannot have, because they can never render an adequate return for the rational love which it is in man's power to bestow. Much less are we bound to them by the supernatural friendship of charity. We may have this divine friendship with the angels because, although lower by nature than they, we are yet exalted by grace to be sharers in the same beatitude. Nay, we may become friends of God, for He, by assuming our nature, has made Himself like unto ourselves, that He might raise us up to become participators in His own Divine Nature. But between rational and irrational beings true friendship can never subsist.

The second corollary we have already noticed in the course of our inquiry, namely, that whereas the soul of man is immortal, the soul of the brute perishes with the material body, through the organs of which its every operation is elicited ; we detect in it no power which tends towards the universal, the limitless, the eternal. There are some who think that the spark of life, once enkindled, can never be extinguished, whatsoever the grade of life may be. The fancy is a pleasing one, and I must confess to certain visionary speculations of my own on the subject, but it would be mere idle talking to put them forward, since we can find no solid basis of reason in support of such theories ; while, although we have no emphatic revelation on this matter, the tendency of our Christian revelation seems to teach that there is only one thing upon earth endowed with immortal existence, and that is the human soul.

It is useless to argue that the justice of God requires that there should be a hereafter for the beasts in compensation for the sufferings they may have endured in this life. All such arguments based on *what God ought to do* are at best the flimsiest arguments of convenience, an attempt to tie down infinite Intelligence to the limitations of finite intelligence. Arguments of this kind can only be of weight when drawn from the actions of Jesus Christ, the Word Incarnate, Who, by having assumed human nature, submits Himself to a standard which it is not beyond the compass of human reason to measure. But the law of compensations as known to God, has in it depths quite beyond our ken. And indeed, to look

at it from a practical point of view, I should think it would be very difficult to find a brute in whose life the sum of sensitive pleasure was not in excess of the sum of sensitive pain.

To recapitulate what I have said: there is a difference between reason and instinct as wide as the poles, because reason consists in the apprehension of universal ideas, their application to the discovery of less universal or altogether particular conclusions, and from this the intelligent use we are able to make of the forces in nature, the limitless variety of and continual improvement in those works which are the outcome of reasoned conclusions; while instinct, being founded on the perception of particular sensations, is confined within the straitened limits of a certain definite sphere. We further saw that whereas man has, in common with the brutes, the power of sensitive perception, whereby he experiences sensations agreeable or disagreeable from the particular objects which come within the range of his faculties of sense, yet he has in addition another and higher power by which he can abstract from particular things universal conceptions, so that he is able to dominate and control whatsoever is merely material. We saw, moreover, that it cannot be shown that the inferior animals give indication by their actions of possessing any such power. By consequence we can find no solid argument on which to rest for them a claim to immortality; on the contrary, reason indicates that the soul whose powers are wholly dependent on organs of sense must perish with that body, through which alone it can put forth its operations. Whereas the soul which, though it has

the same power of perceiving, through the organs of sense, particular objects, concrete and individualized in matter, yet is able from them to abstract notions of universal nature, shows that it is not hopelessly bound down to the material, but has in it an element of the limitless, the indestructible and eternal.<sup>1</sup>

Wherefore we conclude that there is a measureless distance between mere brute nature and that human nature which was assumed by Him who was Incarnate by the Holy Ghost of the Virgin Mary, and was made Man.

<sup>1</sup> According to peripatetic philosophy the vital principle in all living things is the "anima," or soul, but only in the case of man is it an immaterial substance, which, though it is dependent on the material body in the first place for its individualization, and though it acts during mortal life through material organs, yet because it is immaterial, as it is shown to be by its power to abstract universal conceptions from material concrete things, it is therefore not dependent on the body which it animates for the continuance of its existence after physical death, as is the soul which is wholly immersed in matter and possesses no immaterial operation.

# THE POWERS AND ORIGIN OF THE SOUL

BY THE REV. P. M. NORTHCOTE

IN a former essay on *Reason and Instinct*<sup>1</sup> I sought to demonstrate that the human soul possesses a natural power which places man immeasurably above every other terrestrial being in the scale of existence, namely, the power of reason. The train of thought thus awakened appeared to me so interesting that it would not be amiss to develop yet more this subject in one or two further short disquisitions.

I use the term "soul" to express the vital principle in all living organic bodies. This is merely a question of names: words are arbitrary symbols used to express ideas, wherefore if any one would prefer to appropriate the term "soul" to the immortal life principle which animates the human body, using some other word to express the intrinsic cause of life in the inferior organisms, there is no reason why he should not do so.

Life is the power of self-movement from an active intrinsic principle. All material things are capable of

<sup>1</sup> C.T.S., price 1d.

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motion : the air will move, cooler air rushing in to supply the place of air which has been rarefied by heat, and so a wind is formed : a stone will move when impelled by the hand, or drawn by the attraction of a larger body : but, as will be seen, the principle of their motion is extrinsic not intrinsic, or at least in so far as it is intrinsic at all it is passive, not active, the power to be moved not the power to move itself. Some inanimate things might at first sight be said to have the power of self-movement, as, for example, the steam-engine, but the principle of its motion is not really intrinsic or *innate*, it comes from the expansive force of steam. It is not necessary to our conception of a steam-engine that it should be able to move ; indeed we know perfectly well that it would rust in the shed unless its motive power were supplied from without. But it is absolutely necessary to our conception of any living thing that it has an innate power of self-movement, even if that self-movement be only the lowest kind, which is the motion of increase or growth from the seedling to the perfect plant. All things that have life have in some way or other an innate power of self-movement.

We divide the life of material things under three headings -vegetable, animal or sensitive, and rational ; under the two former innumerable species exist, the last named forms a species by itself, including men of all races. As there are three grades of life so there are three kinds of soul or life-principle, the vegetable, the animal, and the rational. We shall see in the course of our inquiry that the animal soul includes the perfections of the mere vegetable soul and possesses other perfections over and above, while the rational soul endows the body it animates with all the perfections of both the inferior

forms, adding besides the superlative excellence of reason. All creatures possessing material life, from the highest to the lowest, have in some way the power to transmit the vital energy and so maintain the propagation of their species: we shall enlarge upon this when we come to say a few words anent the production of the human soul.

That all animals have the vegetable faculties of absorbing nourishment, growing, and propagating their species requires no proof. But they have in addition the powers of sense. It is difficult, perhaps, to say where exactly amongst living things sensation begins. Speaking, however, of animals, which are undoubtedly gifted with sensation, we perceive that they possess senses both exterior and interior: the exterior senses apprehend external objects of plurality; the interior senses retain impressions gathered from without, and can distinguish and associate these in the absence of the objects which first induced the impressions upon the exterior senses.

By common consent these senses are admitted to be five in number: sight, which has power to perceive colour, and through colour to become cognizant of shape: hearing, which perceives sound: smell, which perceives different odours: taste, which perceives flavour: and touch, which perceives what is hard or soft, rough or smooth, hot or cold.<sup>1</sup> The noblest of these exterior senses is the wonderful power of sight, but the most fundamental, in which all the other senses are based, is the sense of touch. These senses are all *perceptive* faculties, but following on from them are the different

<sup>1</sup> I speak here according to popular estimation, for we must leave scientific experts to decide what colour, &c., actually is.

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emotions which impel to action, but with these we shall not deal, for it is by the *perceptive* faculties that the nature of the soul is discerned. If the perceptive powers are material, the motive powers which flow from them will be material also.

It is only in the case of man that we can discern an immaterial perceptive power, the motive power proceeding from which, as its faculty of execution, must be immaterial also, namely, freewill: for this is the necessary concomitant of an intelligence able to discern under which of two universal contraries the object of election may be contained. This is particularly noticeable in the choice between good and evil: these are two universal contraries, under the heading of that which is good there are particular actions potentially infinite in number and variety: in the same way under the heading of that which is evil there are likewise an infinitude of possible acts; consequently only the mind which is able to apprehend these two universal contraries, good and evil as such, is capable of making a free choice and therefore of meriting eternal reward by the one or of incurring eternal loss by the other. The soul which cannot discern between good and evil as contrary universals cannot formally sin. We recognize this even in the case of children who have not yet come to a sufficient use of their inborn powers of reason to be able intelligently to discern between what is good and what is bad.

I must not precipitate my inquiry, but must proceed to the consideration of those interior faculties of the soul, which though purely material and exercised through a material organ of the brain, are none the less so wonderful as to give at times to mere animal action the semblance of reason.

We enumerate four interior senses, namely :

1. The common sense ;
2. The power to apprise things as either beneficial or harmful ;
3. The memory ;
4. The imagination.

The common sense is that faculty in which all the other senses are radicated, and its office is to distinguish between the various sensations ; it is necessary to place some such distinguishing power in the animal soul, otherwise sound, colour, savour, &c., impressions conveyed to the brain by the organs of hearing, sight, and taste, would be indistinguishable one from another. I am inclined to think that it is not necessary to consider this faculty as a distinct sense by itself, but rather as a quality of the fundamental sense of touch. The discoveries of modern science in its various branches would, I believe, bear out this view. That man, and with him all the other perfect animals, possess this faculty is beyond all question.

As instance of the power to discern between what is good and what is harmful to the animal itself or to the persons and things it loves : we see that cattle will not browse upon poisonous herbage, and that a female cat will fly at the terrier which approaches her litter. Darwin holds that the operations of this discerning power are largely the result of experience, and adduces examples in proof : we may readily admit this, but at the same time the faculty itself must be innate for experience to work upon ; you cannot build without any foundation at all. Moreover, this faculty, like any other faculty, may be trained : thus you can teach a dog to defend not only itself and its own belongings, but also

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its master and his property : indeed, herein training is scarcely necessary, for as soon as the creature attaches itself to anything, it looks upon that thing as in some sort its own, and that it should care for and defend it is merely the transference of the natural instinct to a new object.

Perhaps a better instance of the training of this power of discernment is the way you can teach even the fiercest kinds of animal not to harm other animals which in their wild state they would esteem their natural prey. For these extreme cases it is usually necessary to associate them together from infancy, if you are to overcome the natural ferocity of the carnivora. I have seen a lamb being brought up together with a leopard cub. But as I watched the gambols of the baby leopard, it occurred to me that the process, though entertaining enough for the leopard, must have been particularly disconcerting to the lamb, and that a trivial accident would cause the frolics to end in a tragedy.

The memory is the power to retain the images impressed upon the brain through the medium of the exterior senses.<sup>1</sup> This faculty is instanced by the manner in which migratory birds will return year after year to the same nesting place, or by the way in which animals will recognize persons with whom they have not been in contact for a long period of time, and will manifest signs of affection or aversion according as

<sup>1</sup> The human memory is far nobler than this, for besides retaining the images of things received through the outer senses, it also retains universal notions, processes of reasoning, sciences once learnt, &c., which higher memory is due to the possession of an immaterial intellect.

their power of discernment apprehends them as friends or foes.

Underlying the other interior senses is the imagination. This sense is the power of preserving and reproducing images, and it is obvious that the imagination must first produce images before the creature can discern them as beneficial or harmful, or apprehend them as things the impressions of which have been before conveyed through the outward senses. But the imagination can do more than this; it is able to group together the images contained in its storehouse into all sorts of fantastic conceptions: as, for example, the Mahomedan conceives in his paradise a river of milk and a river of honey, such things never had actual existence, it is merely an instance of the association of different images for the formation of a fantastic conception.

There can be no doubt that the brutes possess imagination, for this is absolutely necessary as a foundation for the memory and the power of discernment, but how far their imagination is able to group diverse images together is, of course, unknown to us, though I think we can perceive traces of it in some of their actions.

Darwin speaks of the animals inferior to man having the power to *associate ideas*. This language, though it may serve well enough in common parlance, is highly unphilosophical. For an "idea" and an "image" are widely different things; an image is something concrete recorded on the organs of sense, while an idea is a purely intellectual concept, which, being a sheer universal, can only be apprehended by an immaterial faculty which is not determined and tied down to any material conditions.

For example, I associate two ideas for the generation

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of a third when I put together the two ideas that the interior angles of a triangle are equal to two right angles, and that when one straight line falls upon another straight line the adjacent angles are likewise equal to two right angles : from the association of these two ideas a third is generated, namely, that the exterior angle of any triangle is equal to the two interior and opposite angles. Here it will be seen that we are dealing with universals pure and simple, for whatever the dimensions of the triangle may be, or whatever its kind, right-angled, obtuse-angled, or acute-angled, whether equilateral, isosceles, or scalene, it is always true that its interior angles are equal to two right angles and the exterior angle is equal to the two interior and opposite angles. This is a purely intellectual idea, nor do I have to conjure up in my fancy the image of any particular triangle whatsoever for the apprehension of this universal and immutable truth, but when any triangle is put before me I am able to make use of my knowledge in the execution of practical designs ; I apply the universal to the particular.<sup>1</sup> It will be seen that this association of ideas is a very different thing from the association of images which enables me to conjure up the picture of a river of milk.

It is precisely in this confusion between the "idea" and the "image" that we may detect the Darwinian error as regards the origin of the human soul. It is the commonest of all logical fallacies ; he asserts what he has

<sup>1</sup> We cannot exercise thought without making use of some sort of phantasm, because it is the nature of the human intellect to abstract "ideas" from "images." On this subject of the relation of the "idea" to the "common phantasm," let the reader consult Fr. Clarke's *Logic*, where the question is admirably treated.

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to prove, and then drags his assertion from his premises into his conclusion. This may very well bewilder the vulgar, but the trained reason of the logician is not so readily deceived. However, we must not blame others if they do what we are so prone to ourselves, for who that has followed up a pet theory does not know how tempting it is to bridge over a difficulty by a gratuitous assumption? Nevertheless, such a method is not cool, clear reasoning.

If, as I am inclined to think they have, from examples which I shall presently adduce, the brute animals possess this power of grouping together images naturally discordant, they only exhibit it in regard to their immediate wants: wants, that is to say, which are determined by the material conditions of "here and now," a "here and now," however, which is fortified by images recorded in the memory. With man, however, it is far different, for in him imagination ministers to the intelligence, which abstracts from the images of fancy universal notions. Let us take an example or two. That man is a "rational animal" is a universal notion, yet this universal will be limited by the individual's experience of human nature. A pigmy of the great forest of Central Africa will conceive of man that he is a "rational animal," though he will not know how to put his conception into philosophical language. Still, his idea of human nature will be bounded by the pigmies of his own race of whom he has experience, and unless he has seen or heard of other men, he will not be able to conceive of human nature outside that limited sphere. None the less that same universal is responsible for the dramas of Shakspeare. Yet what a marvellous grouping together of images do we not see in the works

of our great dramatist, all acting their proper parts in the light of that great universal, the "rational animal" which constitutes human nature. Hamlet, Lear, Falstaff, Henry V, Iago, are all rational beings giving forth the most brilliant flashes of wit and wisdom, but they are also animal, endowed with the different animal passions, which combine so marvellously to exhibit them to our gaze as good or bad men. With what an astounding penetration must not that mighty intellect have grouped all the potentialities which are contained under that one simple universal idea of a "rational animal."

Euclid is the clearest example of an intellect which grasped mathematical universals, but just think of the power of the imagination which could produce mathematical figures requisite for the proof of his universal problems.

Napoleon could weigh more accurately, perhaps, than any other military genius the effect of opposing forces. Try to conceive the vividness of an imagination which could hold in its grasp whole continents, with their mountains, their roads and their rivers, in order that he might know where to strike with a sure promise of victory.

Of course, these are the highest examples of what imagination is capable, but they serve to show to what heights imagination can go in so perfect an organism as the human brain. We must not expect amongst the brutes anything approaching to this power of associating images, for indeed it is only in the first specimens of human genius that such powers are to be found. Still, it shows us of what wonders mere matter is capable.

For us, who possess imagination under the control of the dominant reason, it is very difficult to conceive of

what that extraordinary power is capable by itself alone. Let us now, however, review some amongst the examples put forward by Darwin in support of his theory that the brute animals are possessed of rudimentary reasoning powers, for the examples adduced by so acute and accurate an observer may certainly be considered as classical.

That animals inferior to man are affected in the same way as he is affected by certain drugs, that they will, like him, acquire a taste for tobacco and alcoholic drinks, is not in the least wonderful, for their nervous system is very much the same as his, and they are endowed with all the bodily senses, exterior and interior, which he possesses. The bodies of both the one and the other have the same material office to perform, and, therefore, it is only to be expected that they will in the main be similarly constructed. If, however, it could be shown that the apes, for example, were known to brew beer, to distil spirits, and to prepare tobacco for their own use, then it would be abundantly evident that they had an intelligent grasp of the nature and properties of these things in the universal, they would show that they had apprehended the universal laws of cause and effect: in fine, we could no longer deny to them the faculty of reason. Darwin admits that the difference in mental power between the highest brutes and the lowest men is simply immense, but he contends that it is a difference of degree and not of kind. In order to *prove* this he would have to show that the brutes are capable of working out intelligent conclusions from universal principles. As far as I can see he has not shown that they are capable of anything higher than the association of images, which does not outpass the capacity of the material faculty of imagination.

Here are three very good examples adduced by Darwin (*Descent of Man*, cap. iii.): he speaks of having seen elephants bring a biscuit within their reach by blowing upon the ground beyond it so that the current of air drove it towards them: again of a bear drawing towards him a piece of floating bread by creating an artificial current in the water with his paw; and, more remarkable still, of a baboon which revenged itself upon an officer by mixing dust and water to form mud and then surreptitiously throwing it over the officer's uniform. Unquestionably these creatures applied a proportionate cause to produce a given effect: so does a wasp when he drives his sting into your hand: but we must ask ourselves had they an intelligent notion of cause and effect? or was their behaviour merely the result of the association of images called into action by a present need under the material conditions of "here and now"? I do not think there is anything in all this which would warrant us in conceding to them anything higher. Dormant in the imaginations of these animals there must have been stored up plenty of images which, called into association by the occasion of the moment, would have been quite adequate to produce the actions recorded of them. In the case of the baboon, which is his weightiest example, the creature's action would amply be accounted for by the image of children playing with mud. We do not know, of course, that this particular image had ever been impressed on the baboon's brain, although such a thing would be most probable as regards a pet animal. But at least we are not justified in ascribing to a superior cause, the existence of which is merely hypothetical, an action which can perfectly well be accounted for by an inferior cause which we know of a certainty to exist,

namely, the brute's power of imagination.<sup>1</sup> To make comparative inferences of this kind is quite within the reach of the imaginative faculty by the association of one image with another. Of course, the operation looks uncommonly like an act of reason: we can only distinguish the one from the other by paying careful attention to the *principle* of action. If that principle is undoubtedly a universal idea, then the source of action is intelligence which abstracts immaterial conceptions from material concrete things; if, on the other hand, the principle of action cannot be shown to be anything more than an image impressed on the fancy, we are not justified in ascribing to reason what is well within the scope of imagination. Darwin's examples (*Descent of Man*, cap. iii.) in support of his contention that the brute animals are able to form "general concepts," by which expression he no doubt means "universal ideas," are feeble in the extreme: they prove nothing more than what we have already laid down as evident, that a brute's fancy is stored with a multiplicity of images, that it retains the memory of persons, things, and former events, and that it has the faculty of discerning between the beneficial and the harmful, friend and foe. Darwin was a wonderful observer, but a deplorable reasoner.

Far different from this is the action of the Bushman, who shapes, barbs, and feathers his little arrow, tainting the point with a subtle and deadly poison. There is no doubt that here are indications of deliberate design. He is not impelled by a present need, for the expedition of

<sup>1</sup> How readily evolutionists would make use of the axiom that "we are not justified in ascribing to a higher cause an effect which might be produced by a lower cause," if it were a question of discussing the merits of a supposed miracle.

war or hunting has not yet been planned, he is simply preparing for future indeterminate emergencies. He has a given effect to produce, namely, the death of his enemy, and he skilfully prepares his arrow as an instrumental cause adequate to the obtaining of the desired effect: he has watched the flight of the bird, and he feathers his arrow that it may fly too: he has learned that he must give his arrow-head a fine point in order that it may penetrate: he demonstrates that he has obtained a knowledge of the nature of poisons, and is able to put his knowledge to an intelligent use.

Moreover there is a great difference discernible on the part of the end in view: the actions of the brutes, however ingenious, had for their end something that was present, concrete and particular; the action of the Bushman, on the other hand, was not determined to any particular and present end, he was simply preparing for the exigencies of hunting and warfare in the universal, he had not in the least predetermined at what object he was going to shoot his arrow. It is the action of reason all over, a universal conception under which an indeterminate number of particular objects may be found.

Here we have compared some of the most sagacious brutes with one of the lowest savages, and we perceive a fundamental difference in their principle of action: the savage indicates most clearly that he is able to grasp universals and work out from them practical conclusions; whereas it cannot be *proved* that the brutes did more than associate images together, and we have no right to *assert* without full and sufficient proof.

Some of the images stored up in the brain of a brute animal are the result of his experiences; he has collected them in his way through life: a new object will puzzle

him until familiarity with it has taught his discerning faculty to decide whether it is useful or harmful, friend or foe. So that we may concede to the brutes a certain amount of mental development : thus, it is much easier to trap a young rat than it is to beguile into the snare an old stager well versed in the ways of life. There are, however, other images which are impressed on their imagination by nature ; for example, the young bird on the first attempt builds its nest on exactly the same pattern that its parents did before it ; we conclude, therefore, that it must have worked upon an image *innately impressed*. I suppose it is the same with regard to the power of discernment, for all creatures will instinctively shun snakes and carnivora which are their natural enemies, without being taught by previous experience. It seems to me that it is quite gratuitous to assume that these innate instincts have become implanted as habits through heredity and that they are the result of the experiences of former generations, there is nothing to prove all this. Even if it were so it would not affect our contention in the least, for they are experiences which deal entirely with *images* and not with *ideas*.

Very different is the mental development of a child. Nature has not furnished him with predetermined images : he has reason and must learn to use it : he will bungle with his first efforts at any art, but as his fancy absorbs more and more images for his reason to work upon, he will see the causes of his mistakes and go on improving until he attains to perfection.

We say that a child reaches the age of reason at about seven or eight. Of course this is merely an arbitrary line of demarcation drawn by theologians to designate the time when a child may be supposed to be able intelligently to

distinguish between right and wrong, and to be capable of appreciating the use of the sacraments. As a matter of fact a child's intellect begins to work simultaneously with the senses, first abstracting, from the images presented through the exterior senses to the imagination, the most universal of all conceptions, namely, sheer existence. Gradually, as the images impressed upon the fancy multiply, this bare notion will be resolved into its parts, until the imagination is sufficiently well stored with images for the reason, to which imagination supplies matter for abstraction, to exercise its office of judging and drawing conclusions. Those whose imagination is torpid will learn with difficulty, those whose imagination is vivid will learn quickly, for the intellect requires that the matter for its consideration be properly presented to it by the fancy. Not but what a vivid imagination is not always concomitant with a strong reason, so that, as we often see, one whose mind works more slowly than another, yet grasps his principles ever so much more firmly and clearly, and draws from them much surer conclusions than his more versatile and volatile neighbour. It is the combination of an extraordinarily vivid imagination with an extraordinarily powerful intellect which produces your Newtons, your Platos, and your Napoleons. In the same way the variety of talents amongst men is to be sought on the side of imagination rather than of reason, for the intellect which grasps universals is wholly indetermined as to the kind of these universals: it is an immaterial faculty liberated from all material trammels. Thus if, through some circumstance of heredity or otherwise, the material organ of the imagination is rendered apt to store up with avidity and produce readily numbers and geometrical figures, you

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will get a mathematician ; if the imagination is more disposed to receive incidents of human life, scenery, and language, you get a romance writer or dramatist : and so on you might enumerate the different phases of mental activity in the affairs of men, you would see that though the intellect guides and controls the fancy, still it is the fancy which determines the quality of the intellect, which considered in itself is by its very nature indeterminate with regard to whatsoever is intrinsically dependent on matter.

The intellectual development of races of men is very similar to the intellectual development of individuals : they attain to their zenith, produce a golden age, and then decline. It is true that the succeeding generation profits by the research and discoveries of the preceding generation, but this is because man is rational, and consequently can use previous conclusions as premises for further conquests in the domain of truth. We discern, however, no progress in the native powers of the human intelligence itself ; history records intellects just as great in ancient times as in modern ; their advance in science was less simply because they had not got the discoveries that our generation has to work upon as a base : we profit by their labours, but we are not superior to them in natural powers of reason. Darwin himself, despite his theory of evolution, seems to admit in his *Descent of Man* that "the old Greeks stood some grades higher in intellect than any race that has ever existed." What a proof this is of the essential superiority of man over all the lower animals. There is no solid reason whatsoever to show that our domestic cats and other brutes have advanced in experience one whit more than those of the ancient Egyptians, while we ourselves are in possession

of innumerable discoveries unknown to them, though we have lost some which they had, nor are we a bit superior to them in the native powers of intellect. How can one weigh all this without claiming for man that his position in the economy of terrestrial beings is absolutely unique?

The nature of the soul gives us the clue to the manner of its origin: whatsoever is purely material, though it reach the apex of what matter is capable, is yet not beyond the power of material forces to produce.

Whether these material forces were implanted germinally in matter, and developed by the slow process of evolution,<sup>1</sup> as indeed some of our greatest theologians say that material life was implanted in matter "in the germ," and that living things were developed from these germs in their proper order under the influence of the First Cause; or whether material life started into being more or less as we see it now by the operation of the same Omnipotent Creative Cause, matters very little as regards our present inquiry; whatsoever powers were given to matter, matter is capable of producing corresponding effects. No one doubts that the reproduction of an image by a mirror, or that the recently discovered invention of transmitting photographs from a distance, is the result of material forces, what powers then may not be contained in that most perfect of organisms, the

<sup>1</sup> By the term "evolution" used here I do not mean the genetic evolution of Darwin, for Father Gerard, in his book *The Old Riddle and the Newest Answer*, a book which deserves not only to be read, but to be learned by heart, shows with convincing reason that genetic evolution is merely an hypothesis, and a lame one at that. But I speak of evolution in its correct sense, namely, the appearance of life upon the globe in a gradually ascending scale of excellence, from the lowest forms to the highest, which is Man.

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brain ; yet the brain is a material thing, and can produce nothing outside the domain of matter and its inherent forces. The soul, then, which exhibits no immaterial operation, is the product of material energies implanted in matter by the Creator. We do not, therefore, need to seek any further cause for the production of merely animal souls than the generative force of the parent animals. It is simply the transmission of the vital energy from the parent to the offspring through those marvellous vitalizing properties of the male seed acting upon the female ovum. Through these properties, once that material life of a certain degree has been called into existence by the Omnipotent Creator, it is capable of propagating itself and producing from generation to generation creatures of the same order : the vital powers of a dog can produce another dog : the vital powers of a horse can produce another horse ; for in such cases the cause is not found inferior to the effect, it is a mere question of the conservation of energy, the highest form of energy certainly, because it is *vital* energy, but it does not imply more than the transmission of this energy from parent to offspring, for since it is within the material order of things, like all other material energies, it is conserved in the kind or species, not in the unit or individual, as I have indicated in my former pamphlet is necessarily the case with the immaterial human soul. Immortality consists in nothing else but this, that the vital energy is conserved not only in the species but also in the individual, because it is an immaterial essence, which, being indivisible, gives forth energy without loss to itself. Once, therefore, that into matter has been infused by the Creator material life, of whatsoever grade it may be, the active force

therein is able to go on propagating that phase of life as long as the world lasts. Species die out, it is true, but as far as we can discern it is not from failure of the vital energy, but from some combination of adverse circumstances which renders their subsistence no longer possible. Granted favourable conditions, there is no reason why a stock should not propagate itself perpetually. But here the struggle for life and survival of the fittest comes in, which, to some extent true, has given rise to the exaggerated theory of the evolutionist with regard to the origin of the species.

We now ask ourselves the question, Can the vital energy of the human seed be the efficient cause, even instrumentally, of the soul which animates the body of man, in the same way that the brute in the generation of another is accidentally the efficient cause of the animal soul? I say accidentally, because the term of the generative act is not merely to produce the soul but to produce the entire composite consisting of soul and body. The answer must be in the negative, because the human soul being an immaterial substance, a unit self-subsisting, it cannot possibly be evolved out of matter; there is no proportion between such a cause and so high an effect. The immaterial is not even potentially resident in the material, and no conceivable activity can engender from it what is in no wise resident in it. Material activities can produce material effects even when we come to such lofty powers as the imagination, but further than this they cannot go. Since, then, there is no latent germ in matter from which the spiritual soul can be evolved, it follows that it must come from without, drawn from the abyss of nothingness by an act of creation. This is only the work of God,

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not even can it be said that the immaterial soul of the parent, using the vital forces of the human seed, is instrumental in the production of the offspring's soul. For the very idea of an instrument denotes that there is something pre-existent which the instrument can touch and work upon, conveying to it the action of the principal agent. In the evoking of existence out of sheer nonentity no part can be found for the instrument to play. We conclude, therefore, that each individual human soul is the outcome of a distinct creative act on the part of God alone.

As to when the soul came into being, the opinion of Plato, Origen, Leibnitz, and others, that all souls were created simultaneously in the beginning of created things, and that they were infused into the bodies prepared for them according to the order and disposition of God's providence, though very fascinating and productive of all sorts of beautiful speculations, we must nevertheless, I fear, relegate to the domain of imagination: for there is not the faintest proof that our soul existed before its entrance upon this world's stage, while all metaphysical reasoning which is within our reach would persuade the contrary. We must, therefore, conclude that the soul was not created prior to the body which it animates. No one, however, knows the precise moment when the soul is infused into the body: it may be in the moment of conception, so that all the developments of the fetus take place under the unconscious influence of the soul adapting a body to its own requirements, and overcoming, partially or wholly, the accidental difficulties found in the matter to which it has been imparted as the life-giving principle. Much might be said in favour of this view, and personally I rather incline

towards it, This, however, is not the teaching of Aristotle, for he argues that the soul, being the form of an organic body, will not be infused into that body until the organization of the body is sufficiently advanced to admit of its becoming the instrument for so noble a thing as the immaterial soul. He holds, therefore, that the female ovum, under the vital energy of the male seed, gradually develops, passing through every phase of life, from the lowest to the highest, until a body is prepared fit for the reception of a true human soul, at that precise moment the soul is created by God and infused into the body which it assumes and animates, expelling the succeeding form of an animal soul to which it had reached in the process of generation. It is very curious how thoroughly evolutionistic is the embryology of old Aristotle; we must certainly admit that he was an observer inferior to none that have come after him.

But Aristotle's evolutionism is of a much saner type than the kind that we know. Huxley, quoted and approved by Darwin, tells us that Von Bauer proved "that no developmental stage of a higher animal is precisely similar to the adult condition of any lower animal." Anything more subversive of Darwinism than this candid admission it would be hard to imagine. We are expected to assume that these different steps in the evolution of man as we know him did once actually exist, yet there is now no trace of them even in fossil remains. However, the obedient disciple of Darwin must throughout be omnivorous in the matter of swallowing arbitrary assumptions, so no doubt this will not give him very much trouble amongst the rest. A man who is capable of acquiescing in the notion that "the sense of hunger and the pleasure of eating were,

no doubt, first acquired in order to induce animals to eat," is capable of assenting to almost any proposition that might be put forward. It seems to me that genetic evolution demands some colossal acts of faith founded on nothing better than mere human guess-work.

If we adopt Aristotle's opinion as the most probable, we ask ourselves at what time may the human fetus be considered sufficiently developed to admit of receiving a form which requires so highly organized a body as does the human soul.

In answer to this it is extremely interesting to cite the observations of Bischoff, quoted by Darwin in his *Descent of Man*. Bischoff says that "the convolutions of the brain in a human fetus at the end of the seventh month reach about the same stage of development as in a baboon when adult." The most highly endowed of the apes touch high-water mark in the matter of animal sagacity, one would therefore conclude that about the end of the seventh month of development the human fetus approximates to that state of perfection when it would be sufficiently prepared for the infusion of the spiritual soul. Somewhere near this time, then, we may suppose that the soul is created and simultaneously infused, and the term of human generation is reached, namely, the formation of a man. What it is which decides the sex no one has been able to discover: all theories which have been advanced, when examined, prove inadequate.

One last word as to the conclusion to be drawn concerning the soul from the manner of its production. By what means a thing comes into being, by the same means, in an opposite direction, it ceases to be. The soul of the brute is indeed a simple thing, having in

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itself no elements of corruption. We perceive this from the fact that, though the powers of the animal soul operate through bodily organs, they yet survive even when the organ is rendered impotent as a channel for vital operations. For example, if the eyes become diseased blindness is the consequence, yet the visual power still remains in the soul, for if the eyes can be restored to a healthy condition the brute will see once more. Nevertheless, though the mere animal soul is simple it is not self-subsisting, that is to say, it has no subsistence independent of the body which it animates and through the organs of which all its vital operations are conducted, for it affords no evidence of any immaterial operation as does the human soul, which would show that its essence, although informing and animating matter, is yet radically independent of matter. Wherefore we conclude that, as it accidentally came into existence with the generation of the composite compounded of soul and body, so it will accidentally cease to exist with the corruption of the composite.

It is otherwise with the human soul, its immaterial operation of intelligence, the power to abstract from matter universal conceptions and turn them to an intelligent use, shows that its essence is immaterial, that it could come into existence only through an act of creation by God. A thing can cease to be only by that motion which is directly contrary to the motion which gave it being. The contrary to creation is annihilation, from sheer nothingness to sheer nothingness, just as the contrary to generation is corruption; unless, therefore, which is impossible, it can be proved that God annihilates, we must conclude that the human soul of all earthly forms is alone immortal.

## THE USE OF REASON

BY THE REV. P. M. NORTHCOTE

HAVING spoken in my two former essays<sup>1</sup> about the difference between reason and instinct, I must now say a few words about reason itself.

The office of mind is, in the first place, to know truth, and secondarily, under the light of truth, to be the guide of action. Nothing, therefore, is more important to the intelligent nature of a being endowed with understanding than that it should know aright. I am in possession of truth when my mind conceives a thing to be as it is in reality.

If the conception of my mind is not in agreement with the reality of that which I consider, then there is an error in my understanding: if I use this as a principle of action, my actions will be beside the mark, because founded on a false basis. For example, no one has as yet constructed a really workable flying machine, simply because no one has yet adequately grasped the laws which govern aerial flight: yet such laws do actually exist, and nature is able to turn out flying machines of the most varied type by myriads upon myriads.

<sup>1</sup> *Reason and Instinct* and *The Powers and Origin of the Soul*.

Just as there are three conceivable orders of intelligence, so there are three conceivable ways of knowing: that is, by comprehension, by intuition, and by discourse.

Comprehension is the knowledge of the Supreme Intelligence, who, comprehending Himself the First Cause of all things, from whose Existence all other entities have participated existence, by whose influence all inferior causes are moved to action, who consequently possesses a comprehensive knowledge, not only of everything that exists outside Himself, but also of all possibilities whatsoever, though perhaps these are never to issue from the state of possibility to that of actual fact. How far the beatified intelligence of the saints shares in this knowledge of comprehension we leave to theology to determine as best it can.

Intuitive knowledge is that which, in perceiving anything, perceives also at a glance all the consequences that flow from it. As, for example, an intuitive mind, once it perceived what a triangle is, would instantly grasp all those conclusions resulting from the triangle which Euclid works out with so much labour. Such, according to theology, is the knowledge of the angels, which, being pure spirits, do not abstract their notions from sensible phantasms, but know the nature of things by a ray imparted from the Divine ideas of the Supreme Intelligence. As we reflect upon this, we must concede to the human understanding a certain at least rudimentary power of intuition. There are some judgements which we form about the simplest and most universal conceptions, which follow immediately and without effort upon these conceptions. The most simple and universal of all conceptions is that of sheer existence: immediately

that I conceive the idea of existence I know that a thing cannot at the same time exist and not exist: I do not have to thrash this out, I know it intuitively. In the same way when I conceive the idea of cause and effect, I have no need that any one should prove to me that where there is an effect there must also be some assignable cause; I know it in the very idea of cause and effect. Such judgements as these we call first principles; they are themselves unprovable, being immediately evident, and every subsequent proof supposes them. There is no doubt that our knowledge of these principles is intuitive as soon as we have abstracted from material phantasms the simple and altogether univocal ideas of existence and causality.

There is a certain quasi-intuitive power in the mind of man which goes a good deal farther than this. Any one who is a man of thought is aware that he has been sometimes quite sure of a conclusion long before he has been able to find the reasons by which to establish it. This is particularly evident in the discoveries of physical science: the life-history of many of our great discoverers in this field of knowledge goes to show that they had often arrived at a conclusion of which they themselves felt certain, though it took them sometimes many years before they could evolve the proofs necessary to convince other minds besides their own. If this is not intuition it is something very nearly akin to it. Nevertheless, all such intuitions are valueless for any except the individual himself, unless they are made evident by proofs of reason. This leads us to the consideration of that manner of understanding which is peculiar to the human intelligence as apart from other intelligences, namely, the "discourse of reason."

There are three steps in the discourse of reason. The first is the simple apprehension of a bare idea: for example "gold." This is quite a universal idea; I do not refer to the particular gold out of which my watch is made, but to the nature of gold in the universal.

The second step is a judgement passed upon this simple idea, as it were dividing it up into all the different parts which are included in my conception of the substance "gold." For example, "Gold is a rare metal." "Gold is a simple element." "Gold has such and such a specific gravity." "Gold is of a yellow colour," &c.

The third step is an inference drawn from the collocation of two judgements in which there is one common term. For example:—

Rare metals are precious.

Gold is a rare metal,

Therefore gold is precious.

Here is an inference drawn from the commonly accepted proposition that what makes a metal precious is its rarity: under the heading of rare metals I collocate gold, and so I conclude that gold is precious.

Or again:—

All animals are sensitive.

Man is an animal,

Therefore man is sensitive.

Here the idea of "animal" is that which enables me to link together the two ideas of "man" and "sensitive."

There are two methods of reasoning, each of which has its proper province, namely: deduction, or reasoning downwards from the universal to the singular; and induction, or reasoning upwards from the singular to the universal.

The above are examples of deductive reasoning—

reasoning, that is to say, which proceeds downwards from a more general proposition to a conclusion less general or altogether singular. In the foregoing instance I descend from the more general proposition that "*All animals* are sensitive," to a less general proposition, namely, that "*Man* is sensitive." I can carry this further down still until my reasoning reaches the case of a particular individual ; thus I take up the conclusion of the foregoing inference, and use it as a premise for a further conclusion. *Ex. gr.* :—

Man is sensitive.

John is a man,

Therefore John is sensitive.

So reasons the schoolmaster when he wants to cure John of idleness by the infliction of corporal punishment. Thus reason, which began with universal principles, at last finds vent in vigorous action : it is a conclusion reduced to practice.

There is, however, as I have indicated, another method of reasoning besides the deductive, or method of reasoning downwards, and that is the inductive, or method of reasoning upwards, from the observation of single facts to the establishment of a universal principle. Deduction is in itself far more noble than induction, and, if we could always be certain of our principles, far more sure. However, except in the case of principles immediately known, the most obvious of which are those universal first principles which deal with transcendental notions- notions, that is to say, such as "existence," which embraces all things that are—our reasoning is based upon principles not immediately perceived, but which must be established by a process of induction. Therefore it is that inductive reasoning is of the highest

importance, and in the main appeals to us more strongly than deductive reasoning.

For example in the syllogism given above :—

All rare metals are precious.

Gold is a rare metal,

Therefore gold is precious.

Nobody is likely to call in question the major proposition that “all rare metals are precious,” since there is no assignable reason for a material substance being costly, except the fact that it is scarce and difficult to obtain. The minor proposition, however, that “Gold is a rare metal,” requires proof, and this can only be done by induction, giving statistics of the output of the mines, showing the state of the mints, and, in fine, making it abundantly clear that the amount of gold in the world is less than the amount of silver, lead, tin, iron, copper, &c.

In all our reasonings deduction and induction are so closely interwoven, that it is rare to find a bit of reasoning of any length in which both methods do not have some part.

Very often we can prove a proposition either by deduction or by induction. For example, if I were asked my political creed I should formulate it in this proposition :—

“Monarchy is the best system of government.”

If questioned as to the grounds for my opinion, I should, with the illustrious author of *De Regimine Principum*, first prove it deductively thus :—

National success depends on united action,

But unity of action is best secured by a single  
central authority.

Therefore the Government which has one central

authority is the best calculated to secure national success.

Against this conclusion of mine one having republican tendencies would argue from facts (*i.e.*, inductively). He would say, "Your opinion is all very well in theory, but the facts are against you," and he would proceed to enumerate examples of successful republics and monarchical failures. Here I should have to take up facts also; I should set forth examples of nations that achieved prosperity under a king, and of others which came to grief as republics. I should further show that the successful republics were successful through the instrumentality of a succession of strong men who, though nominally representatives of the people, were virtually kings; I should point out that in times of calamity the only hope for a republic is in the nomination of a dictator. And so on I should labour to prove my thesis by induction. Very likely I should not succeed in convincing my opponent, because an induction is very often not of sufficient weight to convince, while it seems that not everybody is capable of appreciating the force of a deduction. At the same time he would be a very strong reasoner indeed if he succeeded in convincing me that the people ever have or ever will really govern themselves. "The sceptre to the strong" is my maxim, and it is verified wheresoever the people have tried to take government into their own hands. If you could prove by the facts of history that republics are more successful than monarchies, the reasoning of *De Regimine Principum* would fall to the ground, for established facts can overthrow any reasons *a priori*: something must be wrong with our principles, and if we perceive that the conclusions legitimately deduced from them are

at variance with fact, we must set to work to readjust our principles. The great intellectual danger of theorists is that they are apt to overlook facts until they have pressed their reasons so far as to land themselves in an absurdity. It is the office of sound induction to obviate this danger.

Here I must pause to point out that reasoning *a priori* and *a posteriori* is not identical with deduction and induction respectively—a mistake which is sometimes made and which leads to much confusion of terms. *A priori* reasoning is that which proceeds from cause to effect: as, for example, taking for my principle that “Union is strength,” I should argue “Japan is united, therefore Japan is strong.” *A posteriori* reasoning proceeds from effect to cause: thus from Japan’s exhibition of her strength, I should argue that the Japanese are a united people. If the cause of anything is unknown to me I cannot reason from it *a priori*, as is obvious; I can only reason about it *a posteriori* from its effects. Thus it is impossible to prove the existence of the Deity *a priori*, because He has no cause, and even if for “cause” we substitute “reason of existence,” still from this I can prove nothing *a priori* about God, simply because the unbeatified human intelligence does not see God in Himself, and consequently cannot see immediately that His own Nature is the necessary reason of His Existence, because His Nature and His Existence are one and the same thing. We can, however, prove the existence of God by demonstration *a posteriori*. Thus, for example:—

Evidences of design imply the existence of a designer.

The visible universe exhibits evidences of design,

Therefore the visible universe proves the existence of a Designer thereof.

This is reasoning *a posteriori*. I proceed from the visible things of the universe, which are effects, to prove that there must exist an invisible First Cause of all these things. Nevertheless it is clearly deduction, not induction, for I make use of a universal principle which embraces all designers, in order to demonstrate a particular conclusion, namely, the existence of one Designer. This universal principle, which I take as my major proposition in the above syllogism, requires no induction to establish it, because the very idea of "design" includes a "designer": design without a designer is simply inconceivable—it implies a contradiction in terms. But I may, nevertheless, *illustrate* the meaning of the proposition by pointing to works of design—a chair, a watch, a building, &c. —and showing that in every case they owe their structure to the designing intelligence of a carpenter, a watchmaker, or an architect, as the case may be. All *a posteriori* propositions are those which we establish by induction, while *a priori* propositions are immediately perceived as flowing from the simple idea we have apprehended. We must be very cautious not to raise an *a posteriori* proposition to the dignity of one known *a priori*, or we may find the foundations of our reasoning cut away from under us. At the same time to endeavour to apply induction everywhere would be simply fatal to all reasoning whatsoever. In the above syllogism the major is an *a priori* proposition, while the minor is an *a posteriori* proposition: it requires establishing by a very easy and evident induction.

Men have reasoned from the beginning of the world, because it is natural to them to do so; but to the

ancient Greeks is due the honour of having reduced the workings of the human mind to a science. Aristotle laid down the laws of deductive reasoning so fully and perfectly that it would be very difficult to add anything of importance to his teachings on this head. While if we come to look for examples of deductive reasoning we shall find none more beautiful than Euclid's geometry. He starts with thirty-five definitions, twelve axioms, and three postulates; these constitute his principles. He requires no instruments but the pencil, the compass, and the rule; with these to hand he works out problems of amazing intricacy. The demonstrated conclusions of foregoing problems are used as premises in the problems that are to follow after in so orderly a sequence that his little book has come down to us through the ages a monument of what the human intellect is able to achieve by deductive reasoning.

Euclid's geometry is an example of purely deductive reasoning from beginning to end.

Neither was induction by any means unknown to the Greeks; a brief summary of it is given in Aristotle's logic, and he uses it admirably well in his other works where occasion requires. Nevertheless, it was left to our own Francis Bacon and his able interpreter, John Stuart Mill, to elaborate the inductive method.

As Bacon most justly remarks in the first part of his *Novum Organum*: "The syllogism is composed of propositions, the propositions of words; and words are but the signs and symbols of ideas; if, therefore, our ideas are rashly and imperfectly abstracted from the things around us, all our subsequent reasoning upon them falls to the ground."<sup>1</sup> For example: "Copper" is

<sup>1</sup> "Syllogismus ex propositionibus constat, propositiones ex verbis, verba autem notionum tesserac et signa sunt. Itaque si

a word which by common usage signifies a certain metal; if I conceive of copper that it is a simple element, my conception of what copper is goes wide of the truth. If I formulate this erroneous conception into a proposition, saying, "Copper is a simple element," my proposition is false; if I draw a conclusion from this proposition, my conclusion will be wrong. Thus:—

A simple element cannot be further resolved.

Copper is a simple element,

Therefore copper cannot be further resolved.

Here my syllogism is perfect in form, but because it contains a mistaken idea of the nature of copper, it generates a false conclusion.

Bacon is the victim of much misapprehension and some vituperation from the enthusiastic disciples of Aristotle. Indeed, he must be blamed for his somewhat contemptuous manner of treating the deductive method. He was sickened by dialectic verbiage founded on erroneous conceptions, and he thought he must destroy before he could rebuild. Nevertheless, we must perforce confess that his inductive method applied for that purpose for which he mainly intended it—namely, for unfolding the secrets of nature—is not merely the best, but it is the only way by which we can achieve satisfactory results. We may reason deductively from universal principles, but except in the case of propositions immediately known where the connection between the subject and the predicate is perceived at a

notiones ipsae mentis opae verborum quae animae sunt, et tunc hujusmodi structurae ac fabulae bene male ac improprie et rebus abstractae, et vagae, nec satis definitae et circumscriptae, denique multis modis vitiosae fuerint, omnia capiunt.—*Novum Organum* (pars prima).

glance, we must establish our principles by accurate induction. It is quite impossible to learn the secrets of the universe in which we dwell without making careful use of experimental induction. We owe Bacon a very great debt: our progress in physical discoveries, our commercial pre-eminence, the march of all that material civilization in which for many generations the Anglo-Saxon intellect has led the van, is due to the impulse which he gave to inductive reasoning. It has not been an unmixed blessing: as he foresaw with a wonderful prescience, inductive reasoning has proved the most powerful of all weapons in the hands of those who, regarding religion as an impediment to progress, have sought its overthrow. But we must not blame Bacon and his method for this: the fault lies partly with some over-zealous supporters of the old school, who held on to certain principles as though they were revealed articles of faith, whereas they were nothing of the kind; but much more to be blamed are the so-called men of science who set up a theory of their own, and then endeavour to establish it by faulty induction sufficiently plausible to deceive the ignorant many, but hopelessly wanting in the elements of a sound induction. The history of the physical sciences shows a long succession of the rise and fall of such theories. It is perfectly legitimate, even useful, to propound a theory, but the author of it must be content that it should rank only as a theory until he has established its truth by a properly constructed induction; if he is unable to do this he must be prepared to set it aside as unproven, or at most to claim for it nothing more than that it is a working hypothesis.

Induction has two constituent parts—observation and rational inference; we observe facts, and from them we

infer the existence of some universal law, or of the cause of the phenomenon we observe. For example, if we subject any metal to the action of heat, we observe a sensible increase in size: from these observations we infer the general law that "heat expands metal." This principle we can apply for the attainment of all sorts of practical results. Observation without inference is not the action of reason at all; many birds and beasts have extremely acute powers of observation, and some men are excellent observers but poor reasoners. The diagnosis of a malady which a doctor makes can scarcely be called an act of reason except inasmuch as he makes it under the light of a well-established universal principle. For example, the following proposition is a well-established principle of medical science: "Sore throat, sudden rise in temperature, swollen glands of the neck, rash, nausea, and strawberry tongue denote scarlet fever." When a doctor diagnoses a case of scarlet fever he makes the following conjectural syllogism: -

Such and such symptoms denote scarlet fever.

John Smith exhibits such and such symptoms.

Therefore John Smith has scarlet fever.

The major proposition is a sure principle established by the inductions of former physicians, and so firmly grounded that it is now a fixed principle of medical science; but the minor proposition merely requires observation, and could scarcely be considered an act of reason at all unless it were made under the light of a universal as a means of arriving at a particular conclusion.

Nevertheless, it must be borne in mind that a singular proposition which has received its full and complete individualization either by the use of a proper name for

the subject, or when the subject has been determined by the affix of a definite pronoun, that proposition now becomes equivalent to a universal, and may be reasoned upon or reasoned up to as such. For example, the proposition "Milton was the author of *Paradise Lost*" is a fully individualized proposition, and I can construct a syllogism upon it as though it were a universal. Thus:—

Milton was the author of *Paradise Lost*.

The author of *Paradise Lost* had a great genius,

Therefore Milton had a great genius.

In this way we may consider that the sifting and eliminating process by which the doctor comes to the conclusion that John Smith has contracted scarlet fever is a true induction, though the term of it is not a universal law, but a singular fact. He finds the universal cause of those symptoms we have enumerated, namely, the disease called scarlet fever, individualized in the particular case of John Smith. Merely to record facts is the office of the external senses, the imagination and memory. Induction, therefore, is only an act of reason, because this gathering together of facts is serving an intellect which bases its research on a universal principle that "there is no effect without a cause"; secondly, that it sustains its research with another universal—for example, that "Nature is uniform in her operations," otherwise I could not be sure that heat which expands one bar of iron might not contract the next; and lastly, that the term of the research is a third universal or its singular equivalent, as in the instance I have given, the law that "heat expands metal." To make a good induction is most difficult; in our research after what we think we have hit upon as a law of nature,

we shall probably find instanced examples for, examples against, and irrelevant examples. We must eliminate those facts which are irrelevant to the issue we have in hand ; we must find reason sufficient to account for the facts which appear to go against us : and finally, we must show that the facts in support of our contention are conclusive. The five methods which are employed by induction for the sifting of facts have been expounded with admirable clearness by John Stuart Mill. They are equally available either for the establishing of a universal law, or for the diagnosing of an individual case.

A few years ago I journeyed to Cape Town in company with Professor Hutchinson, the celebrated specialist in skin diseases. The object of his journey was to ascertain whether or not the Zulus eat fish, for he was endeavouring to construct an induction which would establish this proposition :—

Leprosy is caused by eating stale fish.

He had heard that the Zulus had leprosy amongst them, yet eat no fish. Wherefore his induction would be valueless unless he could prove that the disease amongst the Zulus was not true leprosy, or else that the Zulus eat fish or its equivalent. The action of the learned professor shows us what care must be used in constructing a sound induction.

An instance of imperfect induction is the book I have several times referred to in these essays, Darwin's *Descent of Man*. In that book he has proposed to himself to establish the following thesis :—

“ Human life has been evolved from lower forms of life.”

Perhaps the strongest argument for his contention is

to be found in the chapter which deals with reversion to former types through arrested development, and the existence of rudimentary and apparently useless organs. No one can deny that the examples he instances are very forcible in support of his theory; at the same time, as regards reversion, he merely instances, without explaining one single example, which militates against him; whereas it would not be difficult to cite hundreds of such freaks of nature which cannot possibly be attributed to reversion to a former type. In this his strongest argument the induction is most imperfect.

When we come to the argument from the records of geology, we find one solitary, by no means well-defined, example in favour of his theory, and *and all the rest* up to date against him. What an induction!

In fairness to Darwin we must here say that in his concluding chapter he states that much that he has said will no doubt be considered "highly speculative." In this we entirely agree with him.

Facts must be tested by rigorous experiment if they are to be of any value in establishing a sure principle. It is because many so-called scientists do not know how to make a proper induction that we have now such a quantity of arrant nonsense floating about in the name of science. The old school of thought which Bacon opposed may have been obstinately tenacious of unsound principles rendered venerable by antiquity, but I think that were Bacon alive now he would be the first to lift up his voice against the tribe of little scientific peddlars who flaunt before the eyes of the vulgar a mass of flimsy intellectual rubbish, mere fictions of the brain supported by some loose and puerile induction. Of course the physical sciences are not the sole

province of inductive reasoning, though it is here that this method finds its widest scope. Indeed, induction enters more or less into almost every sphere of mental activity. For example, the canons of criticism which guide the historian and the antiquary in their researches are not immediately known: they are principles arrived at by induction. Here again we see how all important it is that these inductions should be properly worked out, otherwise goodbye to truth and historical accuracy. We must, moreover, bear in mind that even a thoroughly well-established canon of criticism is not infallibly applicable in every case, because it deals with contingencies and moral issues, not with the iron mechanical laws of nature.

So much for the universal principles either immediately known or arrived at by induction, which are attainable by the natural light of the human intelligence, and form the basis for the discourse of reason. But we may well ask ourselves the question, May it not be that the understanding can be furnished with principles other than those attainable by the light of nature alone? For it is obvious that, if there are such, he is not a perfect reasoner who has not made these principles his own.

We Catholics claim that there do exist such supernatural principles—*i.e.*, the dogmas of revelation imparted to the mind of man by the light of faith, if only he is willing to admit that light.

When we are once assured that God has spoken by revelation, then surely there is no one who will deny that the dogmas contained in this revelation are principles as firm as the first principle of reason. Both the one and the other have the same First Cause, namely

God, either illuminating the human intelligence by the natural light He gave it in its creation, or else by that added supernatural light which enables the mind to apprehend revealed truth. Indeed, we may say that the truths of faith are in a certain sense firmer than the very first principles of reason, because the light of faith strikes more directly from above upon the created intelligence: there is less of the intermediary between the Illuminator and the illumined. It would be as absurd for one who believed in revelation to call its truths in question, as it would be for him to doubt the first principles of reason.

The only point which admits of argument is the fact of revelation. This must be established by an accumulation of arguments mainly composed of inductive reasoning. You take the prophecies of the Old Testament about the Messiah one by one, and you find them each and all fulfilled in the Person of Christ. You turn to the record of His life and miracles attested by eye-witnesses. You mark the continuous fulfilment of His own predictions, the spread of the Gospel, the stability of the see of St. Peter, the constant hostility of the worldly-minded, and so forth. In fine, you review all that we call the evidences of Christianity. These are facts: each several prophecy is a fact, each miracle is an attested fact, the fulfilment of His words are so many patent facts. These and similar arguments are the different lines of a many-rooted induction which culminates in proclaiming to us the great truth contained in this proposition:—

“Jesus Christ is the Divinely-appointed Teacher of mankind.”

There is no *a priori* proposition from which we can at

once deduce the fact of revelation, for it does not depend upon any law of necessity, like the ebb and flow of the tides ; it depends upon the free pleasure of God. It is, therefore, perfectly useless to look for an argument which will conclude with the conciseness of a "Syllogism in Darii."<sup>1</sup> If this could be done there would be no scope left for the exercise of faith whatsoever. Nevertheless God has given us materials for constructing an accumulative argument of overwhelming force, whereby the human intelligence may find reasonable grounds for its acceptance of revealed truth. It is hard to see how any one can fail to perceive the force of this accumulation of well-reasoned proofs. As a matter of fact every one who thinks at all does perceive it, but those who do not wish to admit the light of faith very naturally make it their business to use all possible ingenuity in order to weaken the different members of this argument, or more commonly to divert their own and others' attention to some little side issue, passing by without notice, in fact afraid to look at, the crushing evidence which remains against them. The very hostility which the fact of revelation excites is in itself a proof of the conclusiveness of the arguments to be brought in its favour. I say conclusiveness, for an induction does really conclude, although in a different manner to a deduction. The criterion of truth is evidence, and whatsoever form of argument you use, so long as it begets evidence, that argument is conclusive.

<sup>1</sup> A Syllogism in Darii is a syllogism in which the major proposition is a universal affirmative, the minor and conclusion singular affirmatives. There is no universal affirmative from which we can necessarily conclude the fact of revelation, in the same way that I can necessarily conclude that Peter is a reasonable being from the universal affirmative that "all men are reasonable beings."

Some may, perhaps, object to Newman's dictum that the accumulation of probabilities will produce a certainty, on the ground that a cause must be proportioned to its effect. They will say that the heaping up of probabilities can do no more than heighten probability indefinitely. An imperfect induction, it is true, only begets a probability of greater or less strength according as the induction approaches more or less towards perfection; but a perfect induction begets more than probability, its begets certainty: because between the facts adduced and the law of which they are the expression the connection is necessary and certain, only the facts must be piled up and the difficulties removed before that connection is made evident. Once it is made evident then the conclusion is certain! If the matter of our induction be physical facts pointing to a physical law, we shall attain a physical certainty: if the matter be human testimony, circumstantial evidence, &c., we shall attain a moral certainty. Still it is a certainty, not a probability. For example, I believe it is now proved to a certainty that the sleeping-sickness is caused by inoculation from the blood of the crocodile through the bite of the tsetse fly. This now amounts to a physical certainty. That certainty always existed, but it took our bacteriologists years of patient labour before, by the piling up of evidence, by the process of elimination, and so forth, they were able to construct an induction strong enough to make that certainty evident. In the same way the rotation of the earth is a physical certainty, and there always existed a necessary connection between this and the succession of day and night, the course of the ocean currents, &c., yet many days and nights had succeeded each other, the Gulf Stream, the Antarctic Drift, the North and

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South Equatorial Currents, &c., had been in motion for many ages before men perceived the necessary connection between these things and the rotation of the earth. When they did perceive that connection, they saw therein conclusive evidence that the earth revolves upon its axis. In the same way sufficient moral evidence produces moral certainty. If a criminal is to be convicted of murder, the counsel for the prosecution must put forward an accumulation of evidence which will induce a moral certainty of the accused's guilt. You cannot hang a man upon a probability of guilt, however strong that probability may be ; you must have clear evidence of guilt, that is to say proofs strong enough to induce a moral certainty. Perhaps, therefore, it is using rather inaccurate language to say that the accumulation of probabilities begets a certainty, probable arguments will only generate a probable conclusion, but the instances of a sound induction are so many separate proofs each severally inducing a certain conclusion, only they have to be piled up and sifted before we are enabled to *perceive* that the conclusion is indeed certain.

Now as regards the proposition we are considering, namely, "Jesus Christ is the Divinely-appointed Teacher of Mankind." As we have seen, this conclusion cannot be proved by a deduction from an *a priori* proposition : neither is it provable by a physical induction, as in the case of sleeping-sickness or the rotation of the earth, simply because it is not in the sphere of physical facts and physical laws ; but it is made evident by a moral induction resting upon moral data. The evidences of Christianity afford matter for an accumulated argument so overpoweringly strong, that if similar evidences were produced in any court of law as forming a title to an

estate, they would be considered sweepingly conclusive. Nevertheless all this weight of argument is insufficient to generate faith, because faith is a supernatural light above the natural powers of reason. The consequence is that you not infrequently find men who profess themselves intellectually convinced: they yield to the force of evidence, and yet do not believe.

Once, however, that the conclusions of reason, fortified by the higher light of faith, have made us quite sure of this principle, "Jesus Christ is the Divinely-appointed Teacher of Mankind," it follows as a consequence that the dogmas included in His revelation are as firm as the very first principles themselves. The science of theology is that which accepts these propositions as immovably fixed and certain, and then proceeds to reason from them deductively. If the conclusions deduced from these principles are evident, then such conclusions though not themselves of faith unless they have been pronounced so by the Authority of the Church, nevertheless are proximate to faith, and to call them in question would be rash and presumptuous. Here, however, much caution must be used, for in making theological deductions our syllogism is often composed of principles of faith and principles of reason combined. The principles of faith are sure, but the principles of reason may be unsound, abstracted by a faulty induction; consequently the theological conclusion deduced therefrom may be incorrect. Much harm has been done by over-enthusiastic theologians trying to make out that conclusions of this kind are proximate to truths of faith. We Catholics of the present day should not have such a heavy burden of defence laid upon us, had foregoing generations of theologians been more cautious in their

conclusions, and not sought to push doubtful points too far.

But here let me stop. Reason is truly a magnificent heritage, and we are all reasoners by nature; yet reason, like everything else, has its laws, which laws have been deciphered for us by the great masters of the science of logic.

Cardinal Manning, in his beautiful book *The Eternal Priesthood*, expresses his opinion that every child ought to be taught logic as soon as it has mastered grammar. Would that it were so! We should not then so often witness the sad spectacle of men endowed with high intelligence falling into the most egregious and often puerile blunders, simply because their reason has never been trained by scientific methods.

He will be the perfect reasoner who, being completely master of the deductive and inductive methods, has, moreover, his natural intelligence fortified by the supernatural light of faith, which gives him new principles to reason from wholly unattainable by the light of nature. There is still left an empty niche for the world's greatest thinker to fill when he arrives in our midst. But, perhaps, there was only One who ever could have achieved that lofty position, and He instead preferred to speak with Authority and to seal His testimony with His Precious Blood.

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# SCIENTIFIC FACTS AND SCIENTIFIC HYPOTHESES <sup>1</sup>

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MANY persons proclaim and still more believe, being for the most part wholly ignorant of one or other or both subjects, that between religion and science there is an absolute incompatibility, nay, more, a conflict to the death.

“Of all antagonism of belief,” wrote Herbert Spencer, “the oldest, the widest, the most profound, and the most important is that between religion and science.” Those who still believe in this writer will not be surprised that his *ipse dixit* carries great weight with the uninformed multitudes who are incapable of studying the subject for themselves, and who, therefore, conclude that Spencer is right, and that those who believe in religion must necessarily be enemies of science. One object of this paper is to show that this is the most arrant nonsense that was ever penned by rational man, and that between science, properly so-called, and religion, properly understood, there can be no kind of dispute or dissension.

<sup>1</sup> A paper read at the Catholic Conference, Preston, September 11, 1907.

Science, to those who know what that much-abused word means, is the study of ascertained or ascertainable facts, and with such facts, when once established beyond yea or nay, religion has nothing and can have nothing to do. But science, beside dealing with facts, her own especial province, is also, and, as will be shown, inevitably, given to philosophising or indulging in hypotheses framed for the purpose of explaining the facts which are her peculiar province.

Now it is with regard to these two different kinds of occupations of science that this paper is chiefly concerned, and in attempting to indicate what the reasonable attitude of the religious man is, or ought to be to science, it is of the first importance for us to distinguish between scientific facts and scientific hypotheses. Most readers of popular works, having never learnt the alphabet of science, in which they resemble more than one of the writers of the same works, wholly confuse the essential difference between facts and hypotheses, and hence fall into utter confusion as to the whole of the controversy which rages, or has raged, around certain biological ideas and theories.

At the outset, therefore, one must distinguish carefully between scientific facts and scientific hypotheses. The former are matters of observation, the latter of deduction. The former scarcely admit of doubt, if they admit of it at all; the latter may appear to be incontrovertible or may not rise to as high a level even as a pious opinion. For example, it is an unquestioned fact that some living creatures have backbones and some have not; that certain animals live in one part of the world and in that part alone; that certain acids combine with certain bases to form certain combinations or salts.

There is no gainsaying facts such as these, nor has the Church anything to say to them save in so far as she chooses to use them in building up her system of philosophy.

An hypothesis endeavours to explain facts, to bind them together, to co-relate them. As an example we might take the much-debated theory which asserts that all living animals have been derived from simpler forms—the doctrine of transformation.

Before discussing our attitude to such hypotheses there are three points which it will be well to keep in mind :

(1) That what has long been thought to be a scientific fact may turn out to have been all along only an hypothesis, and perhaps an inaccurate hypothesis too. I shall deal more fully with this point when I come to touch upon the question of the so-called chemical elements.

(2) That scientific facts without hypotheses to bind them together are interesting but disjointed. They may, like the sheep's head, afford "fine confused feeding," but the effect upon the student will be like that produced upon the man who attempted to satisfy his literary cravings by reading Johnson's *Dictionary*.

They are like the bricks and mortar out of which the genius of the architect can construct a Westminster Cathedral, but which otherwise remain a confused and meaningless mass.

(3) That these hypotheses are liable, at any moment, to be upset by facts newly come to light. But even if overthrown and cast on the scrap-heap, they may still have served a useful purpose as stepping-stones on the way to truth.

Hence the construction of hypotheses is not only a

legitimate exercise of scientific imagination, it is also an absolutely necessary one if science is to progress and knowledge to increase.

But what is too often forgotten is that many—it would not be too much to say most—of these theories never attain to a greater dignity than of a working hypothesis, and many of them perish before they have arrived even at this pitch of acceptance.

In the biological sciences at least it may safely be said that there is hardly a single theory which can be regarded as being, even in its measure, as firmly established as a mathematical proposition.

Take the theory of evolution which, as the little scientific manuals are never tired of assuring us, unless a scientific man believe, he is undoubtedly lost. What is the real value of this hypothesis? It may fairly be said that it is accepted by most, though perhaps not by all men of science, though the same men of science differ as widely as can be as to how evolution has come about. Few, however, if any, would be so temerarious as to say that this hypothesis rests on as secure a foundation, as, say, a proposition of Euclid, or as one of the positive facts of science like those alluded to previously. But if this be the case, and it can hardly be denied, then this theory, like others, remains only a theory and cannot be accepted as being more than a working hypothesis, though admittedly the most fruitful of results of all the hypotheses which have been put forward by scholars belonging to the biological wing of the scientific army.

As I have already said, this is not the view which is taken of this subject by the compilers of the little manuals which flutter in such swarms from the popular press, but it is of great importance to take these manuals

at their real value and not at that which is set upon them by their writers. A recent writer has very pertinently observed :

“Laymen in science who wish to follow the trend of modern discovery are limited for the most part to one of two things: Either they must read the pseudo-science of the magazines, which is arranged chiefly for dramatic effect rather than for accurate exposition, or they must turn to specialized and technical works written by the discoverers themselves for their fellow-workers—books in which technical training is taken for granted, and the lay-reader, however cultured and thoughtful he may be, becomes utterly and hopelessly lost. The world is, then, divided between men who know and cannot tell, and men who tell and cannot know.”

For the sake of those but little conversant with the literature of science it may be well to give one example of the kind of thing which is here alluded to. Readers of evolutionary books will not require to be told that the stock example of a chain of animals in direct descent is that of the horse and its predecessors, an example which is so much quoted in such books as to lead many to suspect that it is the only quotable instance.

In any case, as ordinarily given, it certainly is a very striking instance, and one which might well be considered to go a long way in the direction of proving the theory of transformation, at any rate so far as this particular species is concerned. And so we find, in one of the most recent and dithyrambic of the little books on evolution, that “this great service, the affording of unquestionable proof of this momentous theory” [of organic evolution] “mankind owes to its trusty servant the horse.”

So impressed with this point is the writer that he proceeds: "The horse always stands to me for three things: First, its obsolescent use as a beast of burden; second, its proof of the truth of organic evolution; third, its priceless services — irreplaceable by any machine—in giving its blood to 'save our children's lives when they are in the clutches of diphtheria.'" The order of the services or aspects of interest of the horse is rather odd, but at least it is clear that the writer in question attached extraordinary importance to the piece of evidence which it is supposed to afford. Indeed, he does not hesitate to describe it as "A Conclusive Instance" in the heading of the chapter which deals with the subject. So much for the man who tells. Let us now turn to the man who knows. For every thousand persons who glance through the pages of the booklet from which I have been quoting, it may be taken that perhaps not more than one will consult the learned *Text-book of Zoology*, published in 1905 by the present occupant of the chair of that subject in the University of Cambridge. Hence but few in comparison will learn what the position of science is on that subject to-day. After describing the points alluded to above, with regard to the so-called ancestry of the horse, the learned writer proceeds: "So far as the characters mentioned are concerned, we have here a very remarkable series of forms which at first sight appear to constitute a linear series with no cross-connections. Whether, however, they really do this is a difficult point to decide. There are flaws in the chain of evidence, which require careful and detailed consideration. For instance, the genus *Equus* appears in the Upper Siwalik beds, which have been ascribed to the Miocene age. It has, however, been maintained that

these beds are really Lower Pliocene or even Upper Pliocene. It is clear that the decision of this question is of the utmost importance. If *Equus* really existed in the Upper Miocene, it was antecedent to some of its supposed ancestors. Again, in the series of equine forms, *Meshippus*, *Miohippus*, *Desmathippus*, *Protolhippus*, which are generally considered as coming into the direct line of equine descent, Scott points out that each genus is in some respect or other less modernized than its predecessor. In other words, it would appear that in this succession of North American forms the earlier forms show, in some points, closer resemblances to the modern *Equus* than to their immediate successors. It is possible that these difficulties and others of the same kind will be overcome with the growth of knowledge, but it is necessary to take notice of them, for in the search after truth nothing is gained by ignoring such apparent discrepancies between theory and fact."

With which last statement every rational person must fully agree, and must conclude that in this case at least the man who told of the "Conclusive Instance" was not aware of what the men who know had been thinking about the point which he endeavours to present as incontrovertible evidence. It is true that he quotes Huxley in support of his contention. But then that distinguished man has been dead for some time. Scientific work did not come to a close with his death, and, as will be shown, the tendency of scientific work is quite as often to upset as to establish earlier theories.

We conclude, then, that the formation of scientific hypotheses is legitimate and useful; that each has to be carefully weighed and no hasty judgement formed upon it, and that its real value is to be estimated from the opinion, the carefully matured opinion, of genuine

workers, and not from the *dicta* of magazine articles or of popular manuals of science.

In this connection it seems well to make two remarks : (1) It is clearly foolish at its first enunciation to announce any theory as certainly true and to denounce those who hesitate to accept it, and it is equally foolish to boast that this theory, which may or may not be true, completely upsets all the teachings of religion or even some of them. A single glance at the scrap-heap, where rusting wrecks of bygone theories have been cast, should prevent any man of science from taking up any such rash and hasty an attitude.

(2) It is equally unwise, if I may venture to offer this criticism, for theologians who may perhaps be but little versed in science and its methods, hastily to assume that the adherents of some hypothesis are right in their conclusion as to its opposition to religious teaching, and to condemn it, as has been done in the past, without first carefully considering what the real bearing of the theory upon religion may happen to be. Before taking up any such attitude it would be better to leave the theory for a time to the criticism of scientific men, and how corrosive that criticism may be I must now make some attempt to show.

In doing this I shall take an example from each of the two great branches of science, physical and biological.

Everybody, one may presume, will have heard of the alchemists and of their search for the philosopher's stone which was supposed to possess the power of transmuting one substance into another ; of making, for example, gold out of lead.

This search was based upon the underlying theory that there was a *materia prima* of which all substances

were different manifestations, and the search itself was valuable in that it led to the emergence of the great science of chemistry.

Robert Boyle—"the Father of Chemistry, and the Brother of the Earl of Cork," as his tombstone describes him—a very distinguished exponent of his science, wrote, in 1681, a work called *The Sceptical Chemist*, which was the commencement of the movement which displaced the view of the alchemists that there was a "simple, perfect essence," and replaced it by the theory that there existed some seventy or eighty elements which were unchangeable and undecomposable. It is fair to say that the view that these elements were unchangeable was always guarded by careful men of science with the proviso that they were unchangeable so far as could be seen. Thus Davy stated in 1811 that "to inquire whether the metals be capable of being decomposed and composed is a grand object of true philosophy," and Faraday, in 1815, that "to decompose the metals, to reform them, and to realize the once absurd notion of transmutation, are the problems now given to chemists for solution." But in spite of assertions such as this, it is fair to say that all chemical work for more than two hundred years proceeded upon the assumption that the simplicity of the elements was a scientific fact. And yet recent discoveries seem to show that the fact was in reality only a theory, and that theory not an accurate one; nay, more, that the alchemists in their underlying assumption were nearer to the truth than the many generations of chemists which succeeded them. To justify this statement it must be explained in the first place that some twenty five years ago Sir Norman Lockyer showed, by spectroscopic methods, that a certain element, which he called helium,

at that time not known to exist upon the earth, was to be found in abundance in the atmosphere of the sun. Now recent research seems to show that this helium is a disintegration product of radium, and if that is the case, then one form of matter has been caught in the act of transmuting itself into another. Moreover, there is some evidence that radium itself is a disintegration product from some other substance, perhaps the hitherto called element uranium, or, as others hold, of some unknown substance which accompanies uranium. Finally, the element thorium appears to be constantly engaged in generating from itself another solid element which again decays, its end-product being so far unknown. These facts, if they be facts, are the result of but a few years' investigations; for it is but yesterday that M. and Mme. Curie announced their discovery of radium. Yet they have rendered insecure the whole basis upon which chemists have been working for more than two hundred years, and strikingly illustrate the truth of the statement that great hesitation should be exhibited before scientific facts are regarded as being surely and irrefragably established.

But far beyond the points above dealt with is the view which is now being put forward that all matter is one in its last analysis. That the molecules of which any substance is made up are composed of certain factors called atoms has long been a dictum of science, and the atomic theory, so wonderful and so fruitful, is built upon it. But it is now urged that these atoms consist of corpuscles or electrons, and that each of these is made up of a moving unit of negative electricity together with the ether which is bound up with it. A collection of such corpuscles, surrounded and balanced by a sphere of positive electricity, is an atom. Hence

in essence there is no difference between the corpuscles of any substances. It is their arrangement in the atom, their positions with regard to one another, perhaps the kinks or vortices which they produce in the ether surrounding them, or which exist in that ether, which produce the differences in the atoms and hence produce the differences in the substances of which they are the constituent parts. If all this be true then it is not too much to expect that some means may yet be found by which the arrangement of the corpuscles in the atom may be artificially altered, and one substance actually transmuted into another. Incidentally I may remark that besides rehabilitating the alchemists, this view, so far as I understand such matters, comes uncommonly close to the scholastic theory of matter and form. What I have said shows, I think I may claim, that even a theory of such respectable antiquity and such apparently unimpeachable validity as that of the chemical elements may turn out to have been inaccurate, and that, if such be the case, it is a strong proof of the wisdom which bids one hesitate before rashly forming a judgement as to any hypothesis or its bearing upon any other order of thought.

Turning to the other side of scientific investigation, I must dwell for a few moments on the so-called Darwinian theory, and in doing so, it may be well first to clear up the misapprehension under which so many persons labour, that Darwin was the originator of the doctrine of transformation, of the view, that is, that certain living things were derived from other living things, the theory of what we should call Derivative Creation. Darwin, of course, did nothing of the kind, for such a solution of the condition of affairs in the world of living things was proposed centuries before

Darwin was born. To take only our own theologians, such a view was in essence put forward by St. Augustine, by St. Thomas Aquinas, by Cornelius à Lapide, and by Suarez, as has been shown by Mivart in a now almost forgotten book, *The Genesis of Species*, and by Father Wasmann in his splendid treatise, *Die Moderne Biologie und die Entwicklungstheorie*, so that, whether true or not, the doctrine in one shape or another has a very respectable antiquity. What Darwin did was to suggest a means by which the transformation might have taken place, and his great factor was Natural Selection. The title of his most celebrated work—a title unknown to many who talk and write about the subject, at least so it would appear—is *The Origin of Species by means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, and this makes it clear that it was the method, not the fact, of transformation which he desired primarily to expound. Now many hold that Natural Selection does not exist, and Professor T. H. Morgan, a most distinguished American authority on biological matters, says that the discoveries of the Augustinian Abbot Mendel have given that theory its *coup de grâce*. But if Natural Selection exists it is nothing, and can be nothing, but a sieve by which certain changes, which have in some way or another arisen, are tried and retained or lost. It postulates an internal force of variation following some law, and that again demands the existence of a law and of a law-giver. But let that pass. Darwin called these variations spontaneous, and he insisted particularly that they were individually slight, minute, and insensible. On such an hypothesis most biologists, and at first all, have pursued their work.

But of recent years another school has arisen which

declares that these slight, almost unnoticeable changes on which Darwin relied, are utterly powerless to bring about any transformation, and that it is only by the occurrence—the sudden occurrence—of large and considerable ~~changes~~ or “mutations” that a new species is produced. De Vries, the distinguished Dutch botanist, claims that he has been able to observe the birth of new species in the vegetable kingdom, and he and Bateson and others proclaim that Variation is discontinuous and not continuous ; in other words, that the accumulation of small variations which Darwin counted on, and the efficacy of which Mivart doubted, have nothing to do with the process. It is true that others have cast doubt on the reality of these species, so that the matter must still be considered *sub judice*, but in any case, if these “mutations” really occur, we are brought back to the imperative necessity for some internal cause which produces these large spontaneous departures from the normal condition, and to the equally imperative necessity for a law to regulate them and for a law-giver who has established them and set them in motion.

I take this instance because the hypotheses of Natural Selection and of the efficacy of small variations in the production of species really lie at the bottom of the whole of the Darwinian edifice. These theories were supported with all the marvellous skill and with all the industry and research which were the attributes of that truly great man, yet ~~we now find them controverted~~, and learn that it is possible that they too may have to find their way to the scrap-heap of which I have spoken, a scrap-heap on which will be found also Darwin's beloved “pangenesis” theory, and perhaps some other of his hypotheses.

That these theories should have found their way there in no way detracts from the greatness of the man or the remarkable power which his work has had in stimulating scientific research. It merely proves that fresh facts, of which he was not cognizant, have come to light, facts which upset or seem to upset his theories. But it affords another proof of the extraordinary caution which we should adopt in dealing with scientific hypotheses, the scepticism with which they should be received, and the importance of constantly keeping before one's mind the fact that the hypothesis, however alluring, is only a working hypothesis, and that it must not be estimated at a higher value than that which it really possesses.

On the whole, then, I hope I have been able to show by the examples which I have chosen, and I might have added many others to them, that a scientific hypothesis is by no means necessarily a scientific truth. I also wish to emphasize the point that this is a matter which is perfectly well understood by men of science, and that the reason why there is any doubt at all about it in the minds of the public, is that the public relies for its information upon unreliable manuals and articles which, for effect, pick up a theory and flaunt it in the face of that public as if it were a fact as undeniable as sunrise and sunset, and moreover often draw from it deductions which are frequently unwarrantable and almost always absent from the minds, or at least the books, of the real originators of the main hypothesis.

And so, to any one worried by the bearing or supposed bearing of any scientific hypothesis upon matters close to his heart I would say, "Do not be worried; theories come and go, but God remains for ever, and there can be no possible ultimate contradiction or difference

between the tenets of His Church and the laws of His creation.”

There is just one other point which I should wish to dwell upon for a moment. The extraordinary results of science during the past fifty years, the remarkable fecundity of observation in all branches, the almost incredible progress which has been made, all tend to show the wonderful complexity of the problems with which we have to do and the truly amazing extent of our ignorance. If there is a science in which it might be supposed that really definite knowledge had been arrived at it is that of physics, yet it is not, perhaps, too much to say that physicists are beginning to come to the conclusion that they know nothing of the underlying physical facts of which ordinary things and phenomena are the symbol and the manifestation. The same is true on the biological side. The greater the improvements in the microscope, the more subtle the methods of microscopic preparation, the more delicate and searching the experiments undertaken, the greater are the mysteries which are found to surround us.

There is nothing on which greater pains and study have been expended than on the structure and physiology of the cell, and, to us as Catholics, I may add that it is matter of congratulation that some of the most important and fruitful of this work has been done in the University of Louvain.

It is a small thing—the cell. It might have been supposed by the casual observer that no very great amount of labour would be necessary to clear up all that could possibly be known of such a very limited field of investigation. Yet after so many years of work, after the unceasing toil of hundreds of observers in all parts of the world, the leading authority on the subject

finds himself compelled to write, "The recent advance of discovery has not tended to simplify our conceptions of cell-life, but has rather led to an emphasized sense of the diversity and complexity of its problems."

The sea by the side of which Sir Isaac Newton picked up his pebbles is a much greater one than even he imagined, and the pebbles which remain to be picked up are a million for every one on which a discoverer has as yet laid his hand. How can we then, in the presence of such a confession of ignorance, feel any great confidence in the foundation or longevity of a scientific theory when we know not the day in which some new pebble may not be picked up which will shatter that theory into fragments, as that fine pebble, radium, has shattered so many pre-existing views.

*Pulchra quae videntur, pulchriora quae existimantur, longe pulcherrima quae ignorantur.* We have not come to the confines of knowledge as yet nor anywhere near them.

We cannot understand the flower from the crannied wall, nor even grasp the secrets of one of the many million cells of which it is built up, and it is improbable that future generations will succeed in clearing up all the mysteries which elude our grasp.

But till all these have been cleared up it is hard to say that any scientific hypothesis is irrefutably established.

Facts let us have in as great a measure as possible and theories too, let us have, in any reasonable number : but let us be quite clear as to what are facts and what are theories, and quite definite in our ideas as to the relative value of the two categories.

# SOME DEBTS WHICH SCIENCE OWES TO CATHOLICS <sup>1</sup>

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THAT there have been great discoverers in the realm of science who have professed no religious faith, who, on the contrary, been inimical to all forms of religious belief, is a fact that can hardly have failed to come to the notice of any person who reads the magazines or even the daily papers. That there have also been great luminaries of science like the late Sir George Stokes or like that most distinguished man whose body was laid to rest in Westminster Abbey but a short time ago who, though not members of the Catholic Church, were yet professed believers in Christianity, is also a matter of common knowledge.

That at least as great a number as both of these classes put together have been or are faithful adherents of the great Mother Church, it is the object of this paper to show. It ought not to be necessary to have to show anything of the kind, nor would it be if the reading world was better educated and at least reasonably informed. But this is the day of the imperfectly educated, and the half-informed writers are never tired of telling their quarter-informed readers that between the Catholic Church and

<sup>1</sup> A lecture delivered to the Catholic Young Men's Society, Cork.

science there exists such a deadly enmity that the latter cannot flourish where the former exercises her baneful influence. This is a terrible accusation if it were true, for science being simply the examination and discovery of the facts of nature, the accusation really means that Catholicism is such a thing of shreds and patches that it cannot stand the light of truth, and must therefore seek to extinguish or occlude that light lest it prove its destruction. Well, this is a matter, fortunately, which does not rest upon the word of any man: it is an actual question of fact, and can be determined by a little historical inquiry, an inquiry so simple and so easy that one might have supposed it to be within the capacity even of those half-informed writers of whom mention has just been made.

When I begin the task which now lies before me, the difficulty which I first encounter is not one of discovery but of selection, for there are so many distinguished Catholic names amongst the Fathers of Science that it would be possible to exhaust the limits of this paper by merely giving a catalogue of them. That would be a very uninteresting thing to most people, and I must, therefore, make a choice and select those lines of study with which I am myself most familiar.

Hence I must pass over the Mathematicians, and I must not linger over the Astronomers, though I might have given some account of the Canon of the Cathedral of Frauenburg, who is better known as Copernicus, whose wish it was that there should be inscribed upon his tomb the words, "I ask not the grace accorded to Paul, not that given to Peter: give me only the favour 'Thou didst show the thief on the cross.'" Or I might have given you the true history of the Galileo episode, and might have asked you to consider how it is that if the Church is really so much opposed to science, this is the one case that is constantly being brought up, and why it is that this one case has always

to be garbled to make it bear the interpretation which it is desired to place upon it. Or I might have asked you to consider the lives and work of those two distinguished Jesuits, Fathers Secchi and Perry, whose names are held in honour wherever astronomers meet together.

So also must I pass over the Chemists, and even the Ethnologists, though there is no body of men to whom Ethnology owes so great a debt as it does to the early Catholic missionaries, indeed, to the Catholic missionaries of all ages, and particularly to those who belonged to the Society of Jesus. I cannot do more than briefly allude also to the many names of Catholics, and especially of Catholic ecclesiastics which are to be found amongst the list of those who have helped to clear up the secrets of the earlier races which inhabited this globe, and particularly Europe, during the prehistoric period. Why, even Kent's Cavern, the investigation of which has taught us so much, was rediscovered, after having been lost for years, by Father M'Enery, a Catholic priest!

I intend to devote most of my space to the consideration of some few of those who have been eminent in Biology or in Medicine, for of those two lines of scientific investigation I have some claim to speak, but before passing to them I must pause for a few moments and bring under your notice some remarkable facts connected with Physics, or as it used to be called, Natural Philosophy.

I do this for a twofold reason. Firstly, because the uses of electricity are so numerous, and its applications daily growing so familiar that everybody talks about it, and many people think that they know all about it. But secondly, I bring it under your notice because it is a subject which is peculiarly connected with the question we are now concerned with, and, as we shall see, the names of great Catholic observers are actually embalmed in the nomenclature of the science, though probably not one in a

thousand of those who use the terms have the slightest knowledge of that fact.

Why, for example, do we speak of galvanism, of a galvanic battery, of galvanized iron? We do so because Galvani, an Italian, was one of the earliest and the greatest discoverers in this line of research. Galvani was born in Bologna in 1737; he was educated there, he became—I am proud to think of the subject which he taught—Professor of Anatomy there, and he died there in 1798. He was evidently a man of more than merely nominal Catholic beliefs, since it is recorded in his Life that he made a novena to our Lady in order to be guided aright in his choice of a wife, an act which proclaims his prudence as well as his faith.

But Galvani is not the only Catholic name which is associated with this science. Since it became a commercial matter, electricity has taught us a number of terms employed, as inches are in linear measurement, and as pounds are in weight, the units of various kinds used in the measurement of the mysterious entity which we call the electric current. There are five of these units, the Volt, the Ampère, the Coulomb, the Ohm, and the Farad. How are these strange terms derived, and what do they signify? Well, in the first place, each of them is the whole or the part of a man's name, and I suppose it need hardly be said that those men would not have had their names thus honoured if they had not fully earned the distinction which has been given to them.

The fact is that their names are attached to these units because they were the first or the greatest discoverers, and in some cases both, of the secrets connected with the particular measurement with which their names have become associated. We may dispose at once of the Ohm, which is the unit of resistance, and the Farad, which is that of capacity, since neither Ohm nor that great man, Sir Michael

Faraday, were Catholics. But all the other three belong to us. Volts and voltage are on everybody's tongue who has to do with electricity, however slightly, and the *volt* is the unit of electromotive force. It owes its name to Volta, a great physicist, who, amongst other things, discovered the electrical decomposition of water. He was a Catholic, was born in Como in 1745, and was Professor of Natural Philosophy in Pavia. Scarcely less frequently do we hear of the *ampère*, which is the unit of current, and Ampere, to whom it owes its name, was a Catholic and a Frenchman, born in Lyons in 1775. Afterwards a Professor in the Collège de France, he died in 1836. Finally, there is the unit of quantity, the *coulomb*, and that owes its name to another French Catholic who was born in Angoulême in 1730, and died in 1806. Four, therefore, out of the six names associated most prominently with this subject, embedded in its very nomenclature, are those of Catholics. Of course, it may be argued that they were Catholics because of their time and place of origin. Well, taking into consideration the dates at which some of them lived, I think that might be an arguable proposition, but after all it is not to the point. The allegation we are answering is that it is not possible for Catholicism and Science to flourish side by side, and here we bring you four Catholics, who were such masters in their own particular line that men of science of all religious beliefs and of no religious belief have united to honour them in the most distinguished manner in their power, namely, by giving their names for ever to the nomenclature of their subject. But I can still further add to my argument by giving one more name of a man happily still living. Everybody has heard of the Röntgen rays, and most people have either seen them or at least the radiographs which they produce, but probably few know that the discoverer of these rays is a faithful son of the Church.

Now I must turn from these fields and ask you to consider with me a few only of the distinguished Catholic names which are associated with biological science, a science any dealings with which is, according to some persons, the certain road to loss of faith.

I will begin with the great controversy which raged for so long around the question of the origin of life—biogenesis or abiogenesis.

From the time of Aristotle and for centuries after him down to the days of William Harvey, the discoverer of the circulation of the blood and the tutor of the sons of Charles I of England, for all this long period of time people thought that living things could be originated by non-living materials. Thus they thought that maggots were actually engendered by decomposing flesh; that insects and reptiles arose from the slime of rivers; that eels were formed in vinegar; and the like. It was in no way wonderful that, in days when the microscope was unknown, such ideas should prevail; they were held by all the Fathers of the Church who troubled themselves about such matters, and even St. Thomas Aquinas, that well of learning, when combating the ideas of Avicenna, a controversy which has often and grossly been misrepresented, did not deny—it would have been absurd for him to have done so—the possibility of abiogenesis. Where St. Thomas differed from Avicenna was that the latter maintained that life was spontaneously generated from non-living matter by the inherent powers of that matter alone, whereas St. Thomas contended that, if life did come from non-living matter it was because the Creator had imparted to non-living matter the power of producing life, which would be the sufficient explanation of the question to-day, if—which seems very unlikely—it were actually discovered that, under certain circumstances, life did arise from non-living matter.

Now, the first investigator to disprove some of the stand-

ing proofs—as they were then taken to be—in favour of spontaneous generation was Redi, an Italian, born in 1698, and doubtless a Catholic, though I have no definite information on this point. Redi conceived the idea of protecting pieces of meat immediately after the animal from which they had been taken had been killed, with gauze covers, the precursors of the meat-safes in our larders of to day. He found that if he did this, his pieces of meat produced no maggots, and he was able to prove by this very simple experiment, of which no one had thought before, that it was the eggs of the flies which produced the maggots, and that if the flies were kept off there were no such things to be seen.

However, this only settled the one point in question, and did not close the controversy, which continued in the 18th century, when, oddly enough, the leading antagonists on the two sides were both of them Catholics, and not only that but Catholic ecclesiastics. These two were Needham (1713-1781), who believed in spontaneous generation, and Spallanzani (1729-1799), who denied its existence. It cannot be denied that whichever side was right or wrong, the Church was impartial in this case. Still later, the publications of Pouchet, a Frenchman, led to a further outburst of investigation, and, in the end, to the epoch-making experiments of Pasteur. I have no space to deal with these, but can only say that they all reduce themselves to the original experiment of Redi, that of keeping living things away from the dead matter, which then never produces life. For that is what Pasteur proved, and not that dead matter never produces living. That negative has never been proved, and is probably unprovable. At any rate, no sane person doubts the great scientific interest and the enormous practical importance of Pasteur's work. Nor does any person, who knows anything about him, doubt the sincerity of his attachment to

the Catholic Faith. It was Pasteur who said that the more he knew, the more his faith assimilated itself to that of a Breton peasant, and that he was quite sure that if he knew as much as he wanted to know, his faith would be as great as that of the Breton peasant's wife. And in the centre of the great edifice of science which has arisen as his memorial in Paris, there is a chapel, where all that is mortal of Pasteur rests, and where Mass is said on each anniversary of his death for the repose of his soul—one wonders how long the pious practice will continue under the present circumstances of France.

So much for this great controversy, in which, as I have tried to show, Catholic names have been prominent from the earliest to the latest times, for Mr. Burke, the author of the latest unsuccessful attempt to prove abiogenesis, is also a member of our Faith.

I turn now from what has been one of the greatest, and perhaps one of the most important of all scientific battle-fields; to another subject of great importance and entrancing interest, that of regeneration. I suppose most people know that if one cuts a worm in two pieces, each of them will develop into a new complete worm; also that if one cuts off the leg or the tail of a newt, the injured creature will re-grow the member of which it has been deprived, and will go on re-growing it as often as it is taken off. Such a process in a major or minor form takes place in all living things. We even see examples—very slight examples—of it in ourselves or our neighbours when we watch the healing of wounds. I have no space to devote to giving examples of this curious process, nor of dwelling upon the philosophical importance which it possesses. What I am concerned with is the connection with it of Catholic names, and of these that of Spallanzani was one of the greatest, the very Spallanzani of whom I wrote a few lines above. For it was Spallanzani who found out about the division of the

worm, and it was Spallanzani who made the discoveries as to the power which the salamander or newt had of regrowing its limbs, so that all the work which has since been done has been really nothing more than an amplification of the discoveries of this Catholic ecclesiastic. But Spallanzani was not the original discoverer of regeneration in animals. That honour belongs to another Catholic ecclesiastic, the Abbé Trembley, who carried out his classical experiments in 1740 on a small water creature called hydra, and showed that if the hydra was divided into two or more pieces, each of these pieces was capable of developing into a new individual. Trembley knew that plants behaved in this way: everybody knows and knew this, but he had never before, nor had any other person, come in contact with such an occurrence in an animal. Now the hydra is green in colour, and Trembley was at first disposed to think that its nature had been mistaken, and that it was really a vegetable, but with a beautiful modesty—which would become any man of science—he wrote: “I felt strongly that nature is too vast, and too little known, for us to decide without temerity that this or that property is not found in one or another class of organized bodies.”

Since the days of Trembley and Spallanzani many papers and books have been written on this subject, but none of them have controverted the work of these two Catholic ecclesiastics, on whom, indeed, the whole edifice of this part of biology may be said to have been erected.

From these two lines of research let us turn to another, that of inheritance, one of the most important and the most mysterious of all the problems presented to us by living things. The greatest miracle—in the classical sense of *miraculum*—if we were not blinded by our familiarity with it, is that of inheritance. Why should the egg bring forth a chick more or less resembling the fowl which originated it? Why should the child be like the parent?

Why is it that a rabbit never produces a hare, or a rat a mouse? These and other questions go right down to the roots of all biological investigations, and they have as yet received no kind of adequate answer of a physical character. Probably there never will be any such answer, and it is likely that the best that we can hope for is that we may be able some day to know the laws under which inheritance works. Some persons, and they are of great distinction in the realms of science, think that we do know some of these laws and that the Mendelian experiments have really set at rest certain questions which have agitated the scientific world for many a day. Whether this is true or not it is still too early to say. Many firmly believe in Mendel's laws and think that they are the key to all kinds of scientific and practical difficulties, and one writer at least, a distinguished American biologist, goes so far as to say that they have given the *coup de grâce* to Darwin's theory of Natural Selection. Others as vehemently deny the general applicability of these laws, and so the controversy, at times of a very envenomed character, goes on. But who, after all, is this Mendel of whom there is so much talk, around whose discoveries or theories all this scientific controversy rages? Well, Mendel was a monk, and ended his days as Abbot of the Augustinian Abbey of Brünn, and it was in the gardens of this abbey that his classical experiments were carried out.

Moreover, his scientific knowledge was due to his studies of a post-graduate nature in Vienna, and he was sent there by his abbey on account of the scientific bent which his Superiors observed that their young brother possessed. Mendel died in 1884, so that he is a man of our own time and one of the most recent, with Father Wasmann, S.J.—fortunately still with us—of the band of Catholic ecclesiastics who have shed lustre upon themselves by their brilliant and enduring work in connection with biology.

Before I come to my last instance I must not omit to mention the names of Schwann, who was the discoverer of the cell-theory on which the whole science of histology, normal and pathological, is built; of Johannes Müller, after whom the Müllerian Ducts are named, one of the greatest of biologists of the last century; and of Claude Bernard, a physiologist of the very first rank. All of these were Catholics, and, what is particularly interesting, the last named abandoned his religion, became a professed materialist, and yet returned to the Faith before his death and died in full communion with the Church.

Of these and many others I cannot now find space to write, for I must conclude this part of my subject by some account of the life of a man in whom I have always felt the deepest interest, and for whom, if I may legitimately say so, I entertain a great and a deep devotion.

This man is Nicolaus Stensen, after whom is named Stensen's Duct, a structure familiar to every medical student. Now Stensen was, amongst other things, an anatomist, and that has been the line in life which I have followed for a good many years. He also was a convert to the Church, and there again I can match him. But there the resemblance between us ceases, for no duct has ever been named after me or probably ever will be, and I see no immediate likelihood that I shall terminate my career as a bishop as Stensen did. His life is so interesting and so instructive that I may give the main outlines of it.

Stensen was born, of Lutheran parents, in Copenhagen in the year 1638. He became a student in the university in that city, and was taught anatomy by Bartholin, whose name is also familiar to all medical students, as connected with another salivary duct. After some years of study he went to Florence and became Physician to the Hospital of Santa Maria Nuova in that city. Let me here call attention to the remarkable fact that in intolerant Cathol-

Italy, as some people would call it, at a time when religious controversy ran very high, a Lutheran could attain to such an important position. I note this and pass on. Stensen owed his conversion to his connection with this hospital, for in the apothecary's department, acting as dispenser, was an old nun, who never left off arguing with Stensen and praying for him until she had brought him into the Church. After his conversion he was made Professor of Anatomy in Copenhagen, and that is a gratifying piece of toleration on the other side. But he found that his position was impossible on account of the feeling which his change of religion had aroused in the minds of many of his fellow-townsmen. Consequently he returned to Italy, and, refusing various important positions which were offered to him, he settled down to theological studies and was ordained a priest. Eventually he was consecrated—though most unwilling to accept the position—Bishop of Hamburg, and his first episcopal act was to send his blessing to the old nun to whom he owed his conversion. That there may be no doubt of the reality of Stensen's conversion I quote a few lines from a letter which he wrote to a friend on the eighteenth anniversary of his reception into the Church :

“To-morrow [he says] I shall finish, God willing, the eighteenth year of my happy life as a member of the Church. I wish to acknowledge once more my thankfulness for the part which you took under God in my conversion. As I hope to have the grace to be grateful to Him for ever, so I sigh for the opportunity to express my thankfulness to you and your family. I can feel that my own ingratitude towards God, my slowness in His service, make me unworthy of His graces ; but I hope that you, who have helped me to enter His service, will not cease to pray, so that I may obtain pardon for the past, and grace for the future, in order in some measure to repay all the favours that have been conferred on me.”

Stensen was not only a great anatomist, but he was also a great geologist, the father of all modern geology, for on his theories and deductions stands the whole imposing fabric of that science to-day. In fact Leibnitz said that it took more than a century for geological science to reach the point at which it had been left by Stensen's work, and which he had reached at a single bound. When the International Congress of Geologists met in Bologna in 1881 they erected to his memory a tablet, on which there is an inscription commemorating him as a man *inter geologos et anatomicos prestantissimus*.

Stensen, at least, is an example of the truth that true scientific instinct and the Catholic Faith are not incompatible, for in the zenith of his fame, and in the fulness of his intellect, he forsook the religion in which he had been brought up, for the ancient Faith, and that his conversion was no mere incident of his Italian residence he proved by his abandonment of all that the world had to give of scientific honours for the lowly estate of a priest, and by the humility and poverty of his episcopal life.

Stensen was not only an anatomist and a geologist, but he was also, as we have seen, a physician, and this fact leads me to say a few words in conclusion as to the debt which the science of Medicine owes to Catholic members of that profession.

I may commence with the name of Morgagni, who is godfather to a number of structures, which will at once occur to all familiar with the anatomy of the human body. But beyond this, Morgagni was the father of modern pathology, for his great work, *De Sedibus et Causis Morborum*, was what the Germans would call a *Lehrbuch* in this direction. His devotion to the Church was no less than his devotion to science. He was the intimate friend of four Popes: he had a standing invitation to stay at the Vatican whenever he visited Rome, and as eight of

his daughters became nuns, and one of his sons a Jesuit, there can be little doubt as to what the home influence was like.

Passing from the scientific foundation of medicine, we may turn to its practical applications, and here again we find ourselves confronted by Catholic pioneers.

If one goes to a doctor to be examined, or if a doctor comes to see us, there is every probability that he will put the fingers of his left hand on different parts of our chest and rap on them with the fingers of his right, listening to the various sounds which he evokes.

And if he does this, he will quite certainly also listen over various parts of the same region with an instrument called a stethoscope. These processes are called respectively percussion and auscultation, and both of them were discovered by, it would appear, Catholic physicians.

Auenbrugger, who was born in Styria in 1722, first gave the theory of percussion to the medical world, and Laennec, who was born at Quimper, in Brittany, in 1781, discovered the stethoscope, and may well be called the Father of Physical Diagnosis. Of the life of the former but little is known, though one may assume from his date and birth-place that he was a Catholic, but of the latter it may be said that all through his career he was devoted to his religion. It is narrated of him that when travelling with his wife it was their custom to say their Rosary together as they journeyed, and after his death his biographer, Bayle, a life-long friend, said of him :

“ His death was that of a true Christian, supported by the hope of a better life, prepared by the constant practice of virtue ; he saw his end approach with composure and resignation.

“ His religious principles, imbibed with his earliest knowledge, were strengthened by the conviction of his maturer reason. He took no pains to conceal his religious

sentiments, when they were disadvantageous to his worldly interests, and he made no display of them when their avowal might have contributed to favour and advancement."

I should not like to conclude this list of Catholic men of science without adding to it the name of at least one of our fellow-countrymen, and fortunately one there is which at once rises to the mind. I allude to the late Sir Dominic Corrigan, a man whom I can myself recollect, and whose form must still be remembered by many inhabitants of Dublin. With the name of Corrigan must always be associated the elucidation of what is known as aortic regurgitation, so much so that Trousseau, one of the greatest of French clinicians, said that this ailment ought to be called Corrigan's disease. As to his attachment to his religion, it is not necessary for me to speak, for it is known to many still living.

Here I must leave my roll of Catholic men of science, not because my possibilities are exhausted, far from it, but because everything temporal has its limits, and mine are reached.

I think I have at least been able to show that there are a number of names honoured for their work for science which were also, and not less honourable, for their devotion to their religion, and, if I have been able to do this, I have then proved that there is nothing incompatible between the profession of Catholicity and still more the exhibition of its highest developments and the pursuit of science. There is an old proverb which declares, *Ubi tres medici, ibi duo athei*. It was composed at a time when most scientific men followed the pursuit of medicine, that being the only scientific walk in life then known.

It may have had some truth in it, but at least this may be said, that the paths of science are not untreadable by the religious man, and that, as he walks in them, he will

find in front of him the footprints of many who upheld the banner of religion as they did that of science, and who have gone before to that reward which we may surely hope their adherence to their Faith and their honesty of purpose has gained for them elsewhere.

#### NOTE.

For some of the instances narrated I am indebted to my friend Father Cortie, S.J., and for other facts to the erudite works of Professor James J. Walsh, of Fordham University, New York. Since this address was written I learn that there is some considerable doubt as to Trembley having been an ecclesiastic. He is, however, described as "Abbe" in Prof. Morgan's great work on *Regeneration*, on which I relied. On the other hand, I am informed that in all probability Ohm was a Catholic; at any rate he taught for ten years in the Jesuit Gymnasium in Cologne, was called thence to Munich, and is buried in the old cemetery in that city. It is by no means always easy to determine the religious views of people who lived many years ago.

The "Galileo episode" referred to on p. 2 has been admirably treated by Father Gerard in a penny C.T.S. pamphlet.

## THE DECLINE OF DARWINISM

BY WALTER SWEETMAN

THE following very remarkable extract is taken from an article by Mr. J. B. Crozier, which appeared in *The Fortnightly Review* of January, 1904<sup>1</sup> :—

“The same thing happened in a greater or less degree to the specialists themselves. Huxley, the farther he went, the farther he departed from his early belief in Natural Selection as the prime factor in the evolution of species, and the more he became inclined to relegate it to a secondary place ; although with his usual honesty and sterling intellectual integrity, not knowing what the really efficient cause of the varieties was, he wisely gave no opinion. Romanes, and other observers, on the other hand, the more they came to grapple at close quarters with the facts in their special lines of work, the more they became dissatisfied with the doctrine, until at last they fell away

<sup>1</sup> p. 110.

altogether, attributing the facts of variation mainly to 'prepotency' and other *internal* physiological factors, as the agencies which kept the great organic lines of species true to their type by snuffing out through ultimate sterility and decadence all variations that fell outside the limits of permissible oscillation. But beyond marking out some of the characteristics of these hidden internal causes, they could give no further explanation of them than *that so it stood in the will of Providence or Fate*. And now with the gaps in the geologic record on which Darwin himself relied for the full demonstration of his theory, largely filled in, the most eminent palæontologists and geologists, working on the best accumulation of new facts that have come to light since his time, and tired of the ineffective effort to plaster a single formula on the infinite variety of Nature and Life, have degraded the theory of Natural Selection to a secondary and subordinate position, retaining it rather as a cause of the *elimination* of the old and unfit, than as a *creative* cause of the new. Fully developed insects have been found as far back almost as the existence of dry land itself, scorpions of as high a type as those of to-day, and all the present divisions of fishes, as far back as the Upper Silurian; gasteropods in strata where

molluscan life was only just beginning ; whales in the Miocene, and so on ; and, in fact, all attempts to explain the origin of fish, amphibians, reptiles, birds, marsupials, and the higher mammalia by the theory of Natural Selection alone, and without the co-operation of some unseen initiative *internal* agency, are now generally admitted to have been failures."

The italics are the present writer's, but as it stands this extract probably gives us what is now the general opinion of the best informed and most unprejudiced thinkers of the position in the world of thought of extreme or materialistic Darwinism. But unfortunately such reasonable and liberal views have by no means reached the man in the street ; and that generally rather hurried personage is quite convinced that Mr. Darwin owes the dignified resting-place of his remains not merely to having given the world a plausible hypothesis and supported it by a vast array of interesting facts most amiably presented, but to having absolutely proved the truth of that hypothesis up to the hilt, and thus left the old argument from Design as dead as the old astronomy that made Joshua stop the sun. This is the belief that we meet in the whole mass of modern popular literature, and

sometimes it seems to be even acquiesced in by apparently Christian story-tellers. But the writer of these pages has the very strongest conviction that such materialism is absolutely destructive of all sound Theism,<sup>1</sup> and that it is indeed the intellectual Antichrist of our times which, in spite of all attempts to destroy it by making us ignore it, really lurks in almost every human soul ready to help every strong temptation. When men are making up their minds to take a course of which their conscience strongly disapproves, it is very pleasant to believe that all really learned people have come to the conclusion that there is no eternity and no Supreme Judge.

In a short pamphlet printed some years ago, and more recently in the *New York Catholic World* of December, 1901, the writer of this paper tried to draw attention to five arguments against the very foundations of the materialistic theory for the formation of the body of man, which seem to him to appeal to everybody's

<sup>1</sup> In his opinion, the great argument for Natural Religion is that the same Creator who made the eye of man so well to see, and his hand to grasp, could not have made his conscience badly. Yet conscience often hands a man over to misery in this world. Therefore there must be another to make amends.

common sense and to be perfectly unanswerable. As a matter of fact, he has never seen them answered, and therefore he will venture to repeat them here.

“First and foremost,” as we Paddies say, nobody can suppose that a new limb or a new joint, unguided by a Designing Power, began to be exhibited (even with the Ascidians) all completed, or in working order, at once; yet the beginning of every such limb or joint (and probably of many parts of many organs) arising from relative chance, could have been but a deformity, and, therefore, a disadvantage in the struggle for life. How, then, were they—from the knee to a lens in the eye—ever to have been completed? It would seem to be only by persistently refusing to let imagination play upon this, the most important part of the building up of the whole system of materialist Darwinism, that this argument has not been met, but ignored.

Then, again, there is the plain fact that for one useful change introduced by relative chance alone, there should have been, in common fairness, thousands that were not useful, and where are the traces in the strata of this quasi-infinite crookedness? It must have been (according to the old Darwinian ideas) during their formation—the

formation of the strata—that a mammal was built up from a cell; for organic life could scarcely have been flung down from the fixed stars. Now, perhaps, even without looking into embryos, nobody can glance at the stuffed animals in the British Museum without being inclined to fancy that they are all, as it were, shaded into each other. The question is, whether this shading is the work of chance, or of a Sovereign Artist; and surely the fact that there are no fair amount of the failures necessary to relative chance to be found in the crust of the earth should have much to do with settling it. The struggle must have been over every limb and every joint, and between the different arrangements of the limbs and the joints, and where are the traces of all the crooked things that could not have been sufficiently deforming to have destroyed life at once? If we had very many of these crooked things now, men might say that they were a proof that no design guided formation. But it may seem to some of us that we have one; and should it not be a fair sum in proportion that would state that as the ugly and—as far as the present writer knows—useless callosities on the legs of the horse and ass are to the mean between the ages since the separation of the

is a fact  
on gradation

horse-tribes and the removal by natural and sexual selections of the smallest similar blemish, so should the quasi-infinite crookedness and ugliness necessary to build up a vertebrate animal by chance from a cell, be to—the answer.

Thirdly comes the great argument from the beauty of the organic world. No attempt would seem to have been made by evolutionists to account for the beauty, as distinguished from the mere conspicuousness, of shells and fruits, and the thrush's egg. A graver difficulty is how the apes and the lower savages could have invented our noble human frame. Gravest of all is the impossibility of our conceiving how the genius of insects, with the mechanical means at their command, could make at once the never-varying beauty of the wings of the ornate butterfly, and the as invariably changeful gracefulness of many of our common leaves. The laurestine-leaf, for instance, is always built up in conspicuously different compartments on either side, yet always keeps more or less to its own graceful shape. How could the insects or the plants have managed it?

Then, fourthly, we have the mule argument; but its force is admitted by evolutionists themselves, and need not, therefore, be dwelt on here.

Accompanied as it is by the fact that there is no abiogenesis, it certainly seems to afford strong proof that the Creator wished to keep species separate, so that rational man might have no excuse for thinking that he was descended from beasts who have no consciences.<sup>1</sup>

And the fifth—that to be drawn from a fair observation of the workings of instinct in animals—is perhaps the strongest argument of all. These phenomena—I mean the apparent operations of instinct in animals—must, under materialistic hypotheses, be put down to “heredity”—for, unhelped by any designing power, they are plainly not taught their arts as our human children are; and, therefore, all the wisdom (and all the volitions necessary to meet ever-varying circumstances) necessary to enable a working-bee to avail itself of the chemical forces of the simples which it blends into a jelly in order to turn an ordinary egg into a queen—when, *through some unusual accident*, such an abnormal event becomes necessary—must be contained in the arrangements of the atoms of every egg in every hive. That seems wonderful enough, but what is

<sup>1</sup> There is also a very strong argument to be drawn from the wonderfully complicated preparations made for future events by some insects who could not have been taught.

even more wonderful is how the wisdom got there.

It is no sufficient answer to these difficulties to point to the fact that, if we grant that hereditary instincts influence human motives, it is as wonderful as if they created human volitions ; for it is manifest that, being hereditary, they must depend entirely upon forces contained in or transmitted by the reproductive cells. So again with the recuperative powers of tissues, and, indeed, with the extraordinary developments of organic life from seeds generally. Christian philosophy must maintain that the natural dispositions are but the stamp of individuality given to each human soul. It would be but a poor artist that would let his statues leave his hands having all precisely the same formation ; and we are forced to conceive that the operations follow regular rules of which we can learn the nature only from their results. At all events, the fact of many things being wonderful is no adequate explanation of another thing being more wonderful still ; though such an attempted explanation must be familiar to readers of Mr. Darwin. Besides, it is plainly one thing to say that such arrangements were made by a Designing Power, and another to say that they were made by what may be called

relative chance. Almost equally astonishing to think of are the combinations of mechanical wisdom that must be in the egg of the spider,<sup>1</sup> and even if we could fancy an elderly working-bee lecturing on chemistry, the wisdom of the moth in choosing the best possible spot for her eggs is almost as wonderful, and she is only in the first hours of her existence as a moth, and has clearly heard no lecturer whatever.

It is plain, too, that as a means of meeting the

<sup>1</sup> In the *Contemporary Review* of September, 1895, Dr. Weismann writes: "In the first place, some animals—numerous insects, for instance—possess instincts which are used only once in a lifetime. As examples, there are the many kinds of web-making, such as that seen in the Bombacidae, which is executed in so wonderfully adaptive and complicated a manner, and which each individual has always, as at the present day, carried out but once in a lifetime. These instances prove that instincts of the finest and most complicated kind may arise simply by the process of natural selection." But it is manifest that the Professor requires quasi-infinite time for his hypothesis, and this Science and Lord Kelvin will not give him. And indeed it would seem to be plain that his perfectly honest hypothesis (as far as the writer can understand it) can scarcely meet the fact of the bee's jelly. In *The Last Link*, page 76, Haeckel says of it that he is of opinion that "it would be better to accept a mysterious creation of all the species as described in the Mosaic account."

facts of these phenomena, the simpler form of Natural Selection is quite as strong as the more plausible teachings of Mr. Spencer, since it is evident that there can be no gain here from the transmission of acquired peculiarities, for the bee which missed the flower containing the proper chemical elements, and sucked the one next it could do its hive no good whatever. But here I will let the two very able disputants speak, more or less, for themselves, upon their whole system.

In the *Contemporary Review* of March, 1893, (a) Mr. Spencer has shown with admirable clearness that "co-operative parts" do not necessarily vary together, and that, to adapt a prairie-dog to the leaping suited to a mountain country, both fore-limbs and hind-limbs must be "co-adapted" together; and that, since the probabilities are "millions to one" against the first alone being produced by what he seems very properly to call "fortuitous concourse of atoms," there must be "billions to one" against both being simultaneously achieved by the same cause alone, and that the "old hypothesis of special creations is more consistent and comprehensible."

At page 446, indeed, he distinctly lays it down that *either there has been inheritance of acquired peculiarities, or there has been no evolution.*

Spencer (23) ...

On the other hand, Professor Weismann shows that wonderful as the changes must have been that went to produce the Irish elk or the assumed prairie-dog, the changes are just as wonderful in the soldier-ants of certain species, which being sterile and producing no offspring cannot hand on their structural peculiarities, and which spring from queens destitute of the peculiarities they transmit. Accordingly, he on his part lays down that his principle—which Mr. Spencer calls “the fortuitous concourse of atoms”—*can alone explain the adaptation of organisms without assuming the help of a principle of design.*

Mr. Spencer replies by asserting that the ancestors, for instance, of the Amazon ants had the big heads now possessed by the sterile soldier-workers but not by the fertile queens. This, however, would be hard to prove. Indeed, it is not easy to say which is most difficult to imagine, that queens so shaped should grow soldiers, or that soldiers so shaped should grow queens. It must be remembered, also, that the same queens produce other workers besides soldiers and of totally different construction. Mr. Spencer eloquently describes all the processes that must have occurred in order to enable the Irish elk to carry its enormous head of horns. Precisely similiar

processes must have been repeated or reversed in the body of the parent ant in order to turn the ordinary worker into a soldier, or a soldier into an ordinary worker, while she likewise continued to perpetuate other normal forms essential to the community—remaining herself all the time quite different from them all. When this is remembered it may well seem that “fortuitous concurrence of atoms” is just as likely to have brought these things about as any other force we can conceive—*except design*.

On the whole, the controversy between these two very able men must be satisfactory to all who desire to show that, *of the forces known to us*, the design of an artist and of an artist of quasi-infinite power, can alone explain to human reason the phenomena of its environment.

So far, then, as the necessary effects of time and the real nature of animals are concerned, it seems to the writer that we should be all, not only Christian Rationalists,<sup>1</sup> but Christian Agnostics. The polype upsets all our notions of personal consciousness by being bisected and thriving as two polypes. As we have seen, there clearly can

<sup>1</sup> “Etsi fides sit supra rationem, nulla tamen unquam inter fidem et rationem vera dissensio esse potest” (*Council of the Vatican*).

be nothing like our human intellect behind the most brilliant phenomena of animal intellect. How, then, can we be sure that there is anything like human pain behind their phenomena of pain?

But here it is necessary for the sake of fairness to give some attention to the latest issues of the atheist press (Haeckel's *The Riddle of the Universe* and M'Cabe's *Haeckel's Critics Answered*), which seem to make the absolute denial of the possibility of mysteries their fundamental principle, and to maintain that creations or, in other words, evolutions and devolutions have been going on for ever, and which seem, at least to the present writer, to throw back their Darwinism into the dim distances of eternity, and to suggest that our organic forms owe their existence to the unconscious memories of other existences retained by atoms. But this, while plainly admitting the weakness of Darwinism as it was originally put forward, would seem to be itself quite as weak.

Strengthened by a little honest reading of J. S. Mill, upon the probable natural foundations of our human sense of external certainty, it may seem to us that even reasonable infidels should vastly prefer believing in mysteries to believing

in Professor Haeckel's views of the minds of molecules. Why, the noblest human brain that was ever formed has never devised and carried out anything half as wonderful as its own marvellous adaptations, which Professor Haeckel would put down to the admittedly elementary and unconscious memories (and indeed intelligences) of atoms!

The points upon which I desire to insist may thus be summarized.

(1) In a recent work<sup>1</sup> Father Gerard writes with admirable clearness:—

“On Darwinian principles each step in any development can be made, not because it leads to an advantageous result in the future, but only because it is itself advantageous. At each stage favoured individuals survive others because they are favoured here and now, not because when the development they promote shall be completed, their remote descendants will be favoured.”

Applying, then, this principle in the first place to the joints and eyes of the human body, it must seem to many of us as plain as any truth can be (after the impossibility of the truth of direct contradictories), that the principles of Darwinism as put forward by Professor Haeckel

<sup>1</sup> *The Old Riddle and the Newest Answer*, p. 170.

and Mr. Spencer do not make even a plausible attempt to account for the creation of our human frames.

(2) As to the perfectly honest hypothesis of Professor Weismann, it is hard to see how it would try to meet the facts of the bees' queen-making jelly; and probably most of our readers will for once agree with Professor Haeckel when he writes of it:—

“If one denies with Weismann the heredity of acquired characters, then it becomes necessary to have recourse to the purely mystical qualities of germ-plasm. I am of the opinion of Spencer that in that case it would be better to accept a mysterious creation of all the species as described in the Mosaic account.”

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