

# GOD AND THE THEORY OF EVERYTHING

dgboland © 2012

For Aristotle the endeavour to discover the theory of everything necessarily belongs not to Physics but to Metaphysics. The philosophers of the modern era (whose way of thinking modern scientists have generally gone along with) have come to reject the notion that Metaphysics, as understood by Aristotle, has any cognitive value. What this has meant is that the explanations of everything (reduced now to “phenomena” and “events”) are sought entirely within the world of material reality or what is available to sense observation and verification.

Of recent times physicists have begun to talk in terms of being on the verge of discovering the ultimate explanation of physical reality, of constructing a “theory of everything”. We do not pretend to have any great insight into the particular details of what these scientists are referring to. As in most matters of science today the general public, and indeed philosophers of considerable standing, do not have the necessary experience in regard to the experiments conducted, or sufficient mathematical expertise in regard to the esoteric concepts dealt with, to know what exactly is intended by the theories and formulas discussed. So it is very much a matter of (human) faith for all but a select few of us. Not that that is a bad thing; on the whole such faith is quite evidently well founded under modern conditions of communication between scientists.

All that we need is an “educated” awareness of what is being talked about so as to test the conclusions and theories against logic and common sense. Nor do we need to be put off by the sometimes strange names given to objects reasoned to and the seemingly contradictory propositions put forward in an effort to explain new phenomena so concluded to by the scientists. For, as Aristotle himself pointed out, in the order of physical reality there is much evidence of opposition in nature and in a thing’s properties and relations. There cannot be any true contradiction in things but the use of the language of contradiction generally stems from a lack of grounding in Aristotelian logic, and a failure to note the difference between contradictory and contrary opposition.

There is then a great deal of “interpretation” involved in determining what exactly is intended in the language of modern physics. Especially is this so since the development of the New Physics. But we can make some general observations. If the previous absolutist Newtonian physics erred by placing too much faith in a totally deterministic vision of the material universe the new relativistic physics runs the risk of veering to the other extreme of pure indeterminism. Some celebrated physicist/mathematicians whose minds turn to philosophise upon the current state of their science then indulge in a language of absurdity that would outdo if possible the “dialectic” of a Hegelian.

But we do not wish to deny the genuine insights of scientists as a whole. Moreover, they are entitled to use whatever language is useful for their purposes, provided they do not go beyond the limits of their particular fields of enquiry.

The esoteric concepts and propositions that have been developed in modern mathematical physics have generated an array of names and descriptions that boggle the imagination. Built upon a description of the fundamental forces of nature which have been reduced to four, gravitation, electromagnetism, and the strong and weak nuclear forces, we have, not to mention the more familiar protons, neutrons and electrons, names such as quarks, subdivided into up and down, strange and charm, top and bottom. These are held together by the strong force referred to, mediated by gluons. Electromagnetic forces, it seems, are mediated by exchange of photons. Hadrons are composites of quarks.

A hyperon is described as any baryon containing one or more strange quarks, but no charm quarks or bottom quarks. A baryon is a composite subatomic particle made up of three quarks (as distinct from mesons, which comprise one quark and one antiquark). And so the nomenclature develops as more and more particles are discovered. However, bosons and fermions deserve special mention as they are regarded as constituting the two basic kinds of things or forces within the universe. Of late, attention is focused upon the Higgs boson, now almost a household name, which it is believed will go towards explaining the origin of mass.

But it is not necessary for the purposes of this article to delve into the details of these scientific concepts and theories. For our argument is that modern science, or more specifically mathematical physics is not so constituted as to be able to provide a truly ultimate explanation of anything, let alone a theory of everything. Genuine scientists, such as Higgs, are quite conscious of this and are embarrassed to find their scientific work referred to in such terms, popularised now in the phrase “the God particle”, which, if used by Higgs himself, was so only in jest.

Not that the modern scientist is not striving to know more and more about physical reality, and in that sense seeking to arrive at an ultimate explanation, but he is doing so only according to the limitations of his lines of investigation. It is the purpose of this article to examine what these limitations are and show that, though the more universal language of metaphysics is used by physicists, it is only taken literally by those modern philosophers of science (and admittedly by many celebrated physicists who go along with their thinking) who are basically materialists, but of the more sophisticated kind common today, i.e. those who mix up mathematics with metaphysics (meta-physics as explained below) and believe that everything can be explained universally and ultimately in what are in fact particularist and materialistic (mechanistic) terms.

The modern view is not a crudely empiricist position. For it allows for the contribution of Mathematics towards our understanding of empirical reality. Indeed, if anything, the objects of Mathematics dominate the picture of reality as conceived in modern science so that it is not simply what is sensibly observable which is determinative for the scientific method but what is also conceivable according to the creative ability of the human imagination.

This introduces a complication and indeed a kind of opposition into the modern concept of (material) reality. We might put it that in the modern concept of science

Mathematics plays the role of a meta-physics, not in the Aristotelian sense, but as relating to a strange order or “dimension” of reality, as we can know it, that transcends the purely empirical.

It is rather reminiscent of Plato’s treatment of mathematical objects. For he accorded to them a reality that was distinct from the material order of things, and placed them more with the spiritual or metaphysical (in the Aristotelian sense) than with the material or physical. The modern mind, however, seems to place them at a level of reality that is below the metaphysical yet above the physical in their original Aristotelian senses.

An Aristotelian would say that the problem can only be properly resolved by distinguishing the twofold division of things (into material and spiritual) in the real from their threefold division (into physical, mathematical and metaphysical) in the mind by abstraction. The reality to which mathematically abstract objects relate remains within the physical or material order. The instinct of the modern mind then to disconnect them from the spiritual and metaphysical is surer than that of Plato.

The nature of the connection of mathematical objects with the physical or empirical world, however, remains puzzling, leading to all sorts of conundrums and queer interpretations of “reality”. It is quite confidently believed that the imaginative objects worked upon by the mathematician, or rather mathematical physicist, is the key area in which to look for ultimate explanations in science. Yet, there is no denying the subordination of the formal treatment of mathematics to the empiricist/materialist basis of modern science.

This double orientation would be difficult to understand if all sciences had to be understood in simple terms (as in pure empirical science, pure mathematics etc.). But the duplex character of the object of a science is readily understandable if we are dealing with what was called by Aristotelians and Thomists a mixed or medial science (which modern science in our view comes closest to being). It is a basic fault then with the modern philosophy of science to attempt to think of this notion of science and the scientific method in simplistic terms, like the ancient atomists.

Astronomy is the classical example given by the ancients and mediaevals of a mixed or physico-mathematical science. And we might say that nuclear physics is modelled on such a physio-mathematical investigation of the basic elements of physical reality. Indeed, right from Galileo and Newton we have had the intimate association of modern physical science with mathematics, where the secrets of nature are thought to be best revealed by recourse to mathematical principles and methods.

Considering generally the nature of such mixed sciences St. Thomas asked the question whether they are more mathematical or physical. The answer given is that they are formally mathematical but materially physical. That makes mathematics the higher level of scientific analysis in such a science. But that does not finally settle the question in favour of mathematics. For the form with which mathematics is concerned is something accidental (quantity), whilst the “matter” which physics investigates, despite being by

means of sensible accidents (such as qualities, motion etc.), is something substantial (nature understood as bodily reality).

St. Thomas put it that it is the physical objects, though the material part of the science, which the science is ultimately aiming to understand. On this more fundamental score, then, the science is more physical than mathematical. This is evident in that the conclusions arrived at in the science by mathematical methods need to be verified by physical observation or empirical means. It is not good for the science when the modern physicist lets his mathematical imagination run away with him (as is often the case, as, for instance, with Stephen Hawking).

This explanation by St. Thomas cannot be understood by the modern mind, for it has ruled out in principle or *a priori* the proper notion of substance as applied to physical reality. Yet, this analysis is verified in the attempts by the modern scientists, as “physicists”, to discover the ultimate explanation in science (Mathematical Physics being science in the purest sense in modern thinking). For though the investigations are dominated by mathematical explanations (of a formal kind) the general thrust of the investigations is towards discovering the ultimate “particle” or “force” as understood in physical or empirical terms. In the end therefore the investigation is ordered to a definite vision of the nature of observable or physical reality interpreted in purely material terms.

So it is that the mathematical analysis goes along with the general reductive tendency in explanations in terms of purely material causality. Like a child trying to know what makes something (e. g. a clock) “tick”, the modern (mathematical) physicist takes things apart and, not satisfied with natural means of division or partition of the physical bodies, moves on to employ sophisticated instrumental and even violent means (all quite legitimate in the cause of science). He has succeeded in splitting the atom (the unsplitable in ancient theory). The more elementary parts (“particles”) thereby discovered have proved able to be further divided with the application of greater force.

Fundamentally, then, despite the prominence of the work of the imagination and mathematical abstraction in the modern scientific endeavour, the line of explanation follows what Aristotle identified as that of material causality. The search for an ultimate explanation, or “theory of everything”, is a search for the ultimate material element or “particle”, if one is thinking in (more static) terms of substance or being, or for the ultimate “event”, if one is thinking in (more dynamic) terms of energy or function (expressed in some formula or other).

We should note, however, that the universalist language used by modern physicists does not have the universality it ordinarily has. It can be used in relation to a quite specialised area of scientific endeavour but then it has to be clearly understood as strictly qualified and limited. Before pursuing the limitations needed to be imposed upon the move to an ultimate explanation of reality modern science is taking us let us endeavour to understand in Aristotelian terms, then, how it seems that modern mathematical physics is taken to be the most basic level of science and indeed how mathematical analysis seems to have taken on the dominant role in the ultimate understanding of physical reality.

It is highly significant that since Descartes, in regard to the question of which is the more substantial part of science, the relation has been inverted. For Descartes made quantity (extension) the substance of bodily reality. This has had the effect of confusing the relation between the objects of Physics and Mathematics, making it appear that the mixed science was a simple one. Mathematics, from being only the formal part of modern science, and that focused on an accident (of quantity), took on also the role of being the substantial part, thus usurping the role of physics considered (in classical natural philosophy) as an empirical science, i.e., as the science of physical substances or bodies.

In the history of modern philosophy this is highlighted by a curious consequence. As Locke noted, physical properties other than those stemming from quantity, such as the qualities of hardness, heat, colour, etc., thereby lost their “objective” status, as really inhering in material substances, and were reduced to a “subjective” status, epiphenomena of our faculties of knowledge. Only quantitative properties of bodies, such as size, shape etc., were “primary qualities”, by which was understood that they only enjoyed the substantial reality of quantity, independent of mind.

The effect of this disconnection of “secondary qualities” from the objective order grounded in substance, however, as Hume quickly noted, was to undermine the real basis of all human knowledge, ironically of science itself. Descartes’s attempt to save our certainties from within the mind had ended in a skepticism more radical than any.

Ignoring this philosophical/metaphysical consequence, the modern mind happily consented to work with the combination of the mathematical method of Descartes and the empirical method of Locke, with quantity viewed somehow as the fundamental language of the structure of nature and “phenomena” as its materials. Necessarily this became equivalent to a mechanistic view of the material universe. Galileo’s and Newton’s science came to be a vision of systematic knowledge of observable phenomena in principle fully determinable according to mathematical laws or formulas. God was not excluded from this worldview, but he was to be viewed as the great Architect whose plan of creation could be read by us, or at least by expert mathematical physicists (called for short “Science”).

The search for the ultimate explanations of things, as somehow a deeper insight into the workings of nature, necessarily stopped then at the level of quantity. But, in the mixed or medial science this notion of quantity is tied to the physical order, for it is a physico-mathematics, or mathematical physics, which is indulged in. Its object is not simply abstract quantity as dealt with in Mathematics proper, but concrete quantity, or the physical accident of quantity as found in bodily things, which indeed underlies all the other accidents, but is not to be equated with substance.

Physics and Mathematics are thus in some way fused, and accordingly imagination works in tandem with empirical experience (“observation and experiment”). Mathematics becomes an applied mathematics. Whereas in Mathematics proper there is no study of motion strictly taken now we see the use of vectors as well as scalar quantities. It is here that the modern physicist (delving ever more deeply into the inner reality of physical

bodies) finds that order or structure of parts within the whole body at which he can only marvel.

Unbeknown to the modern physicist, however, it is not an order within the true bodily substance of such things which is being explored and expounded upon but an order of quantitative parts within a quantitative whole (a body seen in terms of dimensions or measurements only). Following out the modern line of thinking derived from the “metaphysics” of Descartes, the modern scientist is satisfied that that is all there is to the substance of material things. This, incidentally, is the order in which we tend to talk of “design”, or quantitative form (or formula), rather than substantial form.

In this view of things, the notion of a Creator God is demeaned to that of a Master Engineer or supremely intelligent Designer of a creation that is limited to something material only. (Hence, the paleness of Paley’s proofs for the existence of God). The universe indeed comes to be conceived after the fashion of a giant machine, an artificial thing, and therefore not in principle beyond the “creative” reach of the human imagination and the “art” of man. Kant’s objections to the proofs for the existence of God are based upon this mechanistic conception of nature.

What of substance the natural philosopher (or natural scientist in the classical language of Aristotle) can detect through a study of natural bodies’ activities and properties has, for the reasons given, evaporated. The necessarily composite nature of bodies into purely intelligible formal and material principles means nothing. Moreover, by an inexorable process of reduction, the universe is reduced to a dead, lifeless machine-like entity, empty of higher forms, such as life and spirit.

That however is not to deny the marvelous and intricate order that is at the level of quantity. We are not concerned to deny that such a concept of the material universe has a beauty of its own that can stir the soul of the scientist. But, philosophically considered, it is a partial and lifeless image that misses completely the true grandeur of even the material order of things. Lost to the natural scientist, so dominated by Mathematics, is the sense of awe that we should have before the wonder and beauty of the natural world.

We should note at this point that the modern scientist is not primarily concerned with expounding the meaning of the world he investigates but with enabling the findings of science to be applied for the benefit of humanity. In further agreement with the original promoters of the modern scientific revolution, Rene Descartes and Francis Bacon, the aim of modern science is not so much to understand reality as to put such knowledge as it can gain to good use, for the benefit of humanity. The practical end takes over from the theoretical. Truth is tied to Utility: Science to Technology.

Accordingly, an ultimate theory of everything is not sought so much for its own sake but in the belief that thereby mankind may secure ultimate mastery of nature generally, and indeed of human nature itself. The search for the ultimate “theory of everything” remains a strong motivation, but it is not primary. Behind this is the belief that

a good theoretical knowledge of science will be productive. Knowledge for its own sake is good. But better is knowledge that is power.

Let us return for the moment, however, to the theoretical side of science and the search for ultimate explanations in modern physics. We have noted above how Mathematics, from being only the formal part of modern science, and that focused on an accident (of quantity), took on also the role of being the substantial part, thus usurping the authority of physics or empirical science as the proper science of (material) “reality”, or bodies. This inversion was helped by the objects of natural science, i.e. the non-quantitative qualities and actions of things, being taken merely as subjective, or “phenomena” only. Mathematics came to be the only “real” way to read nature, and the distinction between pure and applied Mathematics virtually disappeared.

Though now immersed in the material or concrete order of reality the formal character of the object and method of Mathematics nonetheless remains. Hence, the search for an ultimate explanation of reality along the lines of material causality acquires a strange formal and ideal character, and is often taken for a search for the ultimate mathematically conceived unit, like the “singularity” spoken of in the Big Bang Theory. Yet the elusive ultimate particle has to be at the same time something able to account for mass.

This insertion of the mathematical imagination into the search for the ultimate physical element (whether statically or dynamically conceived) gives a quite exotic character to this scientific effort. However, this does not alter the fact that the scientific endeavour here is of the nature of an attempt to find the ultimate explanation of reality by pursuing it as far as one can in the line of material causality. And it is here that the limitations necessarily applying to this scientific approach come to the fore.

For the revolution in science and scientific method that characterizes the modern age is not only in a rejection of Metaphysics as understood by Aristotle – this in fact came later – but also, and more radically so, in a rejection of his notion of science generally, with which went his doctrine of the four causes.

Various factors worked to bring down his philosophy of science, not the least was the discrediting of the Greek astronomy which he took over and incorporated into his general natural philosophy. Curiously enough, it was the applied mathematical side that collapsed. But this came about through better observational findings and measurements. These showed that the physico-mathematical theories constructed upon ancient data had been too speculative, even though they were ingenious speculations which “saved the appearances” on the observational data available.

It was the empirical part of the ancient astronomy, therefore, that was found to be source of the deficiency – and that largely because of the invention of new and better instruments of observation, such as the telescope. The astronomical phenomena or appearances were found not to be as they had been thought to be for centuries. This led to the need for a major revision not just of astronomy but also of natural science as a whole. One could say that the world was turned upside down, a revolution in thinking that of itself

would have been profoundly unsettling for any society. That was the effect of the revision of explanations in only one science. At the same time scientific positions and theories of ancient lineage in all kinds of fields were having to be revised as the spirit of empirical investigation of nature gathered momentum.

For it has to be said that during the earlier period of the Christian era relatively little attention was directed towards the empirical study of nature for its own sake, and therefore to the development the sciences of nature and the necessary correction of theories thus found to be inadequate. This may be attributed to the greater focus on the next life and the concentration on theology rather than philosophy. But it was also and significantly so because of the dominance of a platonic view of the bodily world, which found favour with the early theologians. The tendency was then to present natural things and events in a spiritualistic and symbolic way.

“Such denaturalization of the natural world”, as Josef Pieper said, “sooner or later had to become intolerable; it is simply impossible to live a healthy and human life in a world populated exclusively by symbols” (“The Introduction to St. Thomas”, p.47) The re-naturalization of the natural world is the defining feature of the modern era. It was a good thing in itself. As we shall argue, it was unfortunate that it was accompanied by a false philosophy of science which excluded the more important lines of explanation according to final and substantial formal causation and reduced the notion of science to the methods of a medial science which itself then combined a flawed understanding of material causation with a superficial understanding of formal causation (limited to the order of quantity only).

It need not have involved a rejection of religion but, as it turned out, it did. For though there was a genuine reason for rejecting not just an antiquated view of science but one that was holding back its progress, other extrinsic factors came into play. The most important, as is well known, was the spirit of rebellion against the Catholic Church. Here again there were legitimate grounds to call for reform. But it resulted in the wholesale rejection of the authority of the Church and her theology.

A similar thing happened to the “authority” of Aristotle and his philosophy. The flashpoint here was his natural philosophy, equated with natural science, and allied with what we have seen called medial science or mixed physical and mathematical science. Pure mathematical science was largely unaffected by the scientific “revolution”. As seen above, there were legitimate grounds for the reform of science as largely identified with Aristotle at the time. But the reaction was so strong that he was thrown out “lock, stock and barrel”.

That this was so is quite ironic. For Aristotle was a relative newcomer onto the scene so far as philosophy was concerned and among the Greeks, a race of geniuses, he was the champion of empirical investigation in the natural sciences. Indeed, we may go as far as to say that it was the re-discovery of him in the heart of the Middle Ages that gave a great impetus to the revival of the empirical sciences. If he shared in the tendency of Greek science to speculate too much upon a narrow empirical base, he embodied as much as any in the history of science even up to the present day the spirit of empirical investigation and

experimentation. This can be seen in the mediaeval theologian who most took on the spirit of Aristotle in the study of nature, St. Albert the Great.

Moreover, Aristotle clearly identified the fault that is the major reason for the “conservatism” of science in every age, not excluding his own. He had the spirit of genuine scientific enquiry more than any other, but even he had to work with the state of knowledge of his time which, as it turned out, was filled out with much speculative thinking based upon insufficient evidence. Later investigations were to overthrow nearly all Greek theories of the nature of things astronomical and chemical, though much of that which came within the available range of experience, such as biology and zoology, in which respect Aristotle’s scientific work was particularly experience based, withstood the test of time.

But Aristotle warned against being too “rational” in one’s philosophy of nature. There is an almost irresistible temptation in man to extrapolate his theorizing beyond the available evidence. The modern mind is keenly aware of this but in its philosophy of science goes to the opposite extreme of regarding all general conclusions about things in nature as hypothetical only and incurably so. That attitude flows from and supports a philosophy of radical skepticism, which is plainly false and absurd. In attempting to counter the rationalistic trait in scientific thinking some, such as Kuhn, go too far the other (relativist) way.

Despite this “philosophical” position (or lack of one), however, the modern age is just as prone as were the ancients to re-construct the universe according to its own imagined version of things. Such tendency to rationalism is particularly present in mathematical men of genius, such as Descartes. There is a difference however between the rationalistic “conservatism” in ancient and modern thinking. The grand speculative theories of the Greeks lasted a thousand years; in the modern age they are much more short-lived. But that can be explained by the fact that the empirical spirit became dormant with the break up of the ancient world and, curiously enough, largely by reason of the prominence of the influence of Plato over Aristotle.

With the revival of the empirical spirit in the late mediaeval and early modern period such extrapolated speculation as occurred was overtaken rapidly by new discoveries requiring the grand theories to be constantly revised. In more recent times the rate of change seems to have accelerated (prompting Kuhn’s thesis). Newton’s deterministic physics was overtaken by Einstein’s relativistic physics, which in turn had to accommodate quantum mechanics, much to his chagrin. Now scientists have begun to refer to the “old’ quantum theory.

But within the time frame in which the boldest speculations hold the stage scientific conservatism reigns stronger than ever. Who is bold enough to challenge today the ultimate truth of the Big Bang Theory, which is only the latest grand speculation built upon the evidence available? In all likelihood, given the dizzying advances made in experimental research, is it not possible that in a few short years we may all be paying homage to the Little Fizzle Theory? It is not so much a matter of holding that such theoretical speculation

is false, or indeed useless, but that it only “saves the appearances”, as St. Thomas explained about the Ptolemaic Astronomy, and that it does not exclude the possibility of another theory doing just as well or better.

But the advantage modern science has, in its practitioners if not in its theorists, lies in the return to realism and, if you like, a true materialism/empiricism in regard to the study of the natural world, including the bodily part of human nature. Our practical caution against materialism in regard to our moral life should not be allowed to affect our theoretical study of physical nature, nor indeed the physical side of our human nature. The Church by no means is against natural science, or for that matter modern astronomy and nuclear physics. Indeed, St. Thomas endorses the keen study of the natural material world as necessary to a proper understanding of God, its author.

Thus there is no conflict between religion and science, rather the opposite if the Church’s position is properly understood. Of the philosophical positions held today that of the Church is the most supportive of reason and science. This applies especially with regard to the emphasis given in modern times to the empirical side of science. This is precisely the aspect of science that St. Thomas adopted in favouring Aristotle over Plato (and Augustine) in the interpretation of material and human nature, even to the extent of basing human knowledge squarely upon the senses, so much so as to go along with Aristotle’s claim that one’s degree of intelligence is proportioned to one’s sensitivity at the level of touch. The union between the spiritual soul and the material body in man could not be conceived as more intimate.

The conflicts of the past which have been read as between religion and science are owing to a superficial, and often prejudicial, reading of history. As is clear from the above, it is conservative scientists who provide the greatest resistance to any great theoretical change, let alone of a revolutionary kind, in the grand theories of the time. The innovators too are not always without blame, accusing those who resist what are often radical changes in thinking of obscurantism. Einstein, as is well known, never fully accepted quantum theory and seems to have been accused by some as having wasted the later part of his life contending against it.

However, we are not primarily concerned in this essay to criticize the tendency to rationalism and conservatism in modern science. For it is not something peculiar to the modern era but, as noted, something common to every age of science. It is dealt with here to counter the suggestion that modern scientists are free of this fault, despite their professed commitment to science founded in observation, experience and experiment. It is not rationalism which distinguishes modern natural science from ancient natural philosophy, or the modern scientific method from the Aristotelian. It is, as we intend to show, the opposite error pointed out also by Aristotle, which is an inordinate leaning to a false materialism in the study of nature.

Aristotle identified the rationalistic fault in method in the course of discussing the correct approach to the investigation of physical nature or material reality. Those with any knowledge of his philosophy of nature will be aware that it is based on his doctrine of hylemorphism. That is to say, every actual body or material substance is constituted of two

contrary principles, called substantial form (*morphe*) and primary matter (*hyle*). Hence, it is a mistake to attempt to explain the nature of any material thing by reference to one simple line of causality. No body or part of a body, however minute, is simple, but is essentially composite. No amount of scientific analysis will uncover a basic simple physical unit (contrary to what happens in pure mathematical analysis).

Hence, a purely material line of investigation or analysis will not produce an adequate science of nature. The attempt to do so (which we argue is the fundamental motivation behind modern science and scientific method) is what may be called “materialism” (for which “empiricism” is another more subjective name). It should be noted, however, that for Aristotle, the materialistic or empiricist mode of investigation in regard to physical nature is not so much false as incomplete. It is only if it is not completed by a proper consideration of the formal principle (and that in the order of substance, not quantity), and especially if this is explicitly rejected, that it becomes false. On the other hand, the purely formalistic, or rationalist, mode of proceeding in the consideration of the natural world is false *per se*. For one cannot deal with material reality without taking matter immediately into account.

The same applies in the order of knowledge. One cannot do physics without verifying one’s scientific conclusions by reference to sense experience. In the science of nature empiricism is the lesser error, and it is able to be corrected by incorporation into a sound philosophy of nature. Genuine scientists do not carry their materialist or empiricist methodology to the point of denying natural forms. Generally, indeed, though they are not explicit Aristotelians, they rather have an implicit common sense based natural philosophy.

A rationalist science or philosophy of nature, however, like that of the Idealists, has to be simply rejected. This tendency is to be found in every period. But particularly did it get out of hand during the first millenium of the Christian era. As already noted, however, the philosophical influence of Platonism had a lot to do with this.

It is not being argued here that the founders of modern science were wrong to reject the excesses of the particular formalism and rationalism distinctive of the pre-modern era. In fact the processes of rejection were already under way in the late mediaeval period. The modern philosophers of science, therefore, should be given credit for carrying this scientific revolution through. Thus was restored to their proper places in the investigation of nature the empirical role of the senses and the fundamental role of explanation in terms of material causality. We have put this as the re-naturalization of nature, a recovery of natural realism.

We wish to argue, however, that the circumstances attending this most important change in the history of science did not allow it to issue in a balanced view of science. It was a necessary correction – but it ended in the adoption of a flawed philosophy of nature. It rightly rejected one extreme but fell into the other if, from the point of view of natural science, one not as fatal to genuine scientific achievements as the rationalistic error it supplanted..

The way this presented itself was as a rejection of Aristotle's philosophy as a whole, taking the form of a wholesale rejection of his philosophy and science. It is important to understand, however, that it was at first only the rejection of his philosophy of nature, which was the same as his natural science. To characterize it simply as an anti-metaphysical move at the beginning is to misread the significance of the change. Descartes himself believed he was doing Metaphysics, even if he had inherited a notion of metaphysics that had become distorted in late scholasticism (by medium of the influence of Suarez).

A fundamental subjectivism and rationalism at the metaphysical level had already entered into scholastic metaphysics which was to lead to the rejection of formal and final causes. But it was precisely the rejection of Aristotle's notion of science and causality in the natural order that "cut loose" modern science from its antecedents. This in turn meant the rejection of any realistic notion of metaphysics, a process that was begun by the British empiricists and completed in Kant.

One must not, however, confuse the process of philosophical speculation that marks modern philosophy with the way modern science viewed its scientific task. In the result the modern scientist saw what he was doing as an intensive investigation into the fundamental elements of things combined with the mathematical modeling of the quantitative order of such elements hidden within bodies. This latter side of the scientific endeavour gives to the whole object of science a mechanistic as opposed to a purely materialistic character, and enables the scientist to feel that somehow the human mind is able ultimately to master nature.

This "formal" side of the work of modern science did tend to complicate the scientist's understanding of what he was doing. But, and this is the aspect we wish to highlight, it is the reductive line of explanation in material terms which becomes the "substantive" one and in particular determines the direction of the search for an ultimate explanation of things in modern scientific terms.

Putting the more sophisticated aspects of the project of modern science aside, let us now examine it simply in terms of Aristotle's division of the four causes. There are actually five causes. For in any production the formal type cause has to operate in two ways, one intrinsic and the other extrinsic. As the latter it is called the exemplary cause.

Following Aristotle's way of presenting the causes, in terms of an artificial thing, we can take the example of a house or building. In order to explain why a house exists we must take into account five lines of explanation, the building materials (material cause), the structure of the building (formal cause), the builder (efficient cause), the idea or plan of the building (exemplary cause) and the end or reason for the building (final cause). Take away any one of these causal influences and there can be no building. Nor can the reason for the existence of the building be fully understood. It will be noticed that two of the causal influences are intrinsic (material and formal) and the other three extrinsic (efficient, exemplary and final). One may suspect at this point that there may be some connection here with the five ways or proofs for the existence of God. But we will come to that shortly.

Now Aristotle does not wish us to remain with the example. It is only that the various kinds of causal influence can be understood easily in relation to a work of art rather than a work of nature. But the same necessity of there being such causal lines of explanation applies to the case of natural things, indeed of anything whose existence is not self explanatory. Our understanding of the reasons for bodily things in the physical universe remains incomplete if we are not able to identify one or other of these causal influences upon their existence (which may in fact be the case in many instances).

There are two ways in which we can have a relatively complete understanding of natural things (bodily substances) which falls short of a perfect understanding. The first is where we limit our investigation to the intrinsic causes, and express our notions in logical terms. In fact our own human nature is the only case (in the order of substance) in which this gives us a clear and specific (distinct) understanding. In the case of all other natural things we can only acquire a general understanding (of the genus) with our knowledge of the species of the thing completed in a round about way by consideration of the distinctive accidents of the thing.

The second refers to our use of all the lines of explanation but with our investigation limited to what is called the level of “second causes”. That is to say we do not go to the ultimate level of efficient, exemplary and final causality, but are satisfied with proximate or immediate causal influences. This is the way the natural philosopher and natural scientist proceeds. The reasoning to a first cause, supreme exemplar and last final cause takes one beyond the physical order and into that of the metaphysical. But since all our understanding has to begin in the sensible and physical order of things we understand things first at the level of second causes.

Now it may be seen that in substantial and intrinsic terms the modern scientific method dispenses with all but the material cause and in so far as it allows recourse to extrinsic causes allows it only to secondary efficient causes. There is thus a recognition of the need for an explanation in terms of efficient causality but it is affected by the overriding influence of the material line of explanation so that it is rather understood in terms of pre-existing material conditions. We have seen also that there is a use of formal causality but it is not properly intrinsic to the substance and it too is affected by the overriding influence of the material line of explanation. As noted above, the formal line of explanation is confined to the order of quantity.

In the end we have the overriding thrust of the modern scientific endeavour to explain things by reducing them to their ultimate material elements. The natural urge of the mind to go as far as one can in understanding the causes of things presses the modern mind to do this along the only line of explanation it knows, as it were, and to find the ultimate elements into which a natural body can be divided. That way it is believed we may reach a “theory of everything”.

The problem with this however is twofold. Firstly, there is no possibility of reaching an ultimate indivisible particle. For, as Aristotle has demonstrated, bodies or material things are intrinsically composite – not as conceived mathematically, but as conceived

physically. This composition cannot be detected by sensible or measurable means but has to be seen intellectually. For neither substantial form nor primary matter are “things” or bodily substances in their own right.

The second aspect of the problem is that the line of material causality goes in the direction of pure potency (primary matter) and so rather than such a line of explanation giving us a clearer vision of things it descends into a world of less and less intelligibility. Indeed, the “ideal” limit of this line of “explanation” is nothingness. It is significant that as the scientists feel they are close to having a theory of everything by this route there are some who begin seriously to believe that everything not merely can be explained ultimately as coming from nothing, but must be so explained.

We may say that this, though absurd, is indeed the only logical alternative to belief in God as the first cause, supreme being and ultimate explanation of everything (other than God). For the path to an ultimate understanding of things actually existing has to be upward to higher and higher levels of act, not downwards to the lowest depths of pure potency. That is not to deny the usefulness of analysis of the material kind. But even its masters have realized that the empirical method, which is from the order of material causality, when combined with the mathematical, which is tied to quantity, the first property of things by reason of their matter, is ordered not to understanding so much as of the ability to use things (of the “how” rather than the “why”).

What is missing in the modern approach then are the lines of explanation or causality that lie not on the side of potentiality or matter but on the side of actuality or form (principally substantial form). The modern approach is equivalent to explaining the existence of a house in terms only of the materials brought onto the site so that somehow these materials by some inexplicable “force” arrange themselves into the completed building. Of course, in the case of an artefact taken as a whole such as a house all the other causes are clearly accounted for by the existence and action of the human agent necessarily involved as maker, designer and user.

It is important to point out here that though the existence of one building needs to be attributed ultimately to one maker, according to the idea of one designer and for the sake of one user, its execution generally involves a host of subordinate workers and its use may be had by many delegate users or tenants. So one observing the construction and occupation of the building may never see the principal builder and architect, nor its owner. Nonetheless, the influence of these superior causes upon the existence of the house will be clearly understood to be necessary. It is no argument against the application of this analysis of the various kinds of causality by analogy to the existence of things in nature that the first efficient cause, the original exemplary cause and the final cause are all invisible. All these influences will be visible in natural activities at the level of second causes.

It is true that the substantial forms of things below man are not knowable specifically except through their actions and other accidents. In this regard then it is not easy to distinguish the formal/substantial line of explanation from the material/accidental. Similarly, apart from ourselves, it is not possible to identify distinctly the final cause of a

natural species, as for instance dolphins. But the accidents and parts of things have to be understood formally and finally if they are to be properly dealt with. The actions and parts of things have a distinct finality, more easily recognizable as one goes up the scale of being. The organs of living things, for instance, cannot be properly understood without reference to the ends or objects they are ordered to.

Nor can the faculties of sense knowledge in animals be understood without taking into account differences of form and finality. The eye is for the sake of seeing light and colours, the ear for hearing sounds and so on. Such is obvious enough but there is a complex of senses both external and internal in the higher animals and man that demands close study and discrimination of forms and ends. How is sense consciousness to be distinguished from seeing and hearing? What distinguishes imagination from sensation? What are the differences between memory as it functions in man and in other animals? What is meant by intelligence in dolphins as opposed to intelligence in human beings?

None of these sorts of questions can be answered though mere observation and measurement. For such a materialistically oriented approach cannot bring out the fine distinctions required to be made. Room must be made for an intellectual insight that grasps the forms or essences of things. This is done masterfully by St. Thomas in his commentaries on Aristotle's two "minor" works, "On Sense and the Sensible" and "On Memory and Reminiscence".

The poverty of the modern scientific approach may be seen in the treatment of sleep and dreams, where from a failure to understand their distinctive forms and proper functions it becomes impossible to discriminate the normal from the abnormal or the healthy from the pathological. So it is that much so-called scientific or experimental psychology produces a distorted explanation of the human psyche (as in Freud) and the practice of psychiatry based on such "science" can do more harm than good to the patients, and that not just mentally but also morally.

Sleep, as Aristotle explained it, is a natural binding of the "common sense", i.e. of sense consciousness. That is to say it is a temporary suspension of the activity of this internal sense. Its "form" is then understood even though it is the absence of activity. Its final cause is also able to be seen clearly as being for the sake of the animal's health, by rest and recuperation.

Moliere famously ridiculed this reference to intrinsic powers in his play *Le Malade Imaginaire*, saying that a (scholastic) philosopher would explain why opium puts people to sleep by mentioning the fact that it has a 'dormitive virtue'. That is an explanation in terms of formal cause. But it is only a case of supplying the name to the intrinsic principle. If people are prone to sleep regularly that indicates there is something in their bodily make-up which accounts for this. If a drug has a similar effect it at least identifies the property of the drug. But the positing of a formal or intrinsic power in this case is no different from saying that fire causes heat in things because it has caloric virtue (heat), which other things do not have.

This is a start to investigating more fully what such a physical quality is. It is not meant to stand alone without further definition and explication in terms of material cause which the modern scientist excels in. To posit the existence of formal causes is not as silly as denying their existence and suggesting that the language of powers and virtues is meaningless. A great many of the modern philosophers who mock the scholastics in this regard themselves indulge in an empty rationalism that outdoes the worst kind of nominalistic logicism of the late scholastics.

However, we are more concerned here with ultimate formal (exemplary) and final causes than with causes generally, to show that there are lines of explanation other than in terms of empirical investigations of “phenomena” (material causality) which in its modern application makes use of “formal” mathematical modelling grounded in quantitative relations. This (mixed) scientific method does not necessarily exclude what by contrast are called philosophical methods, but it is generally promoted as doing so.

We have seen how the modern scientific method, so conceived as exclusive, cannot in principle provide an ultimate explanation, so that the search for a “theory of everything” along these lines must forever remain without success. In fact, besides leading to a dead-end it is a distraction from looking for such an explanation in the proper places. The descent into matter is a movement towards pure potency and indeterminacy, and ultimately would come down to nothing, if that were possible.

Of course, pure potency or primary matter is not nothing and so indirectly can be a path to the actual source of all being. In fact, motion, or physical change, which is the level of activity present only in material reality, is one of the facts from which Aristotle and St. Thomas reason to the ultimate explanation of all reality. But the starting point has to be something actual not purely potential, which motion is, being, as Aristotle defines it, “the act of the potential as it is potential”. It is only in so far as something is still potential, as water is to heat until it reaches its boiling point, that it can be said to be in the process of change from one state of actuality to another.

In order to explain this process of change or motion it is necessary to go outside the thing in the process of change or in motion. For what is potential in any respect does not explain its passing to a state of actuality, as is clearly seen in the example. The potential, as such, does not actualize itself. Hence, the existence of motion presupposes the existence of an agent, i.e. something actually (or virtually, which means having a higher degree of actuality which subsumes the form concerned, as an animal is not a plant but has the powers of doing what plants do) that is responsible for the movement from being potentially so to being actually so. Taking this in its most general and essential sense, it means that whilst ever there is potentiality in the thing concerned there needs to be another actual thing to explain its level of the actuality according to that potential.

This cannot go on indefinitely or by a circular process. So the process of motion cannot be explained unless we posit a being without it, which can account for it. That is the notion of something absolutely changeless and unchangeable, or in the language of Aristotle, an unmoved (and unmoveable) being; something of pure actuality of being and

not potential in any respect. That is the metaphysical notion of Pure Act, which is what is meant by God. The English word “mover” can be misleading in this regard. For its notion refers us to something that of itself can move before it does move. But there is no “can move” in the notion of the absolutely first agent. (We use the latin based word “motor” is the same way; for it means only what can move, if we are more focused on it when it is actually causing motion)

The actual English word that would correspond to what is intended to be signified here would be a literal equivalent of the Latin word *movens*, i.e. movent. It is difficult for us to get this pure notion for in our experience even when natural movents act they are in some way also moved to act (which is the basis of the second way of Aristotle and St. Thomas). But in the case of the absolutely first “mover” it must be said that even in creating things God is not moved. God acts without change in himself. The action of God is of an altogether opposite quality to all that is within our experience. This really confirms the proof from motion – for our experience is of things in which there is always some potentiality and the argument has led to a being in which there is none.

So we are already embarked upon the process of reasoning from potentiality to actuality, as opposed to endeavouring to explain things by analysis actual things into their most elementary parts or potential principles. As already noted, according to St. Thomas, there are at least five ways in which the former reasoning can proceed. And these happen to be along the five lines of causality outlined above. Matter and form are intrinsic causes, or reasons (principles of understanding), of bodies, which are the things which come immediately within our experience. The other three, efficient cause, exemplary cause and final cause are obviously extrinsic to the same things.

These three are easily related to the second, fourth and fifth proofs for the existence of God presented by St. Thomas. But how can we relate the first and third ways to matter and form? So far as matter is concerned, this in fact has already been done above in the discussion of the proof from motion, which though not directly from matter is from that “act” which belongs to material things in so far as they are material. It should not be forgotten, however, that where bodies are concerned motion is in the accidental order and is not limited to local motion, but extends to the other two kinds of change, qualitative (called alteration) and quantitative (called growth). Local motion is indeed the flimsiest kind of change and the proof is best presented in terms of qualitative change.

So far as (substantial) form is concerned, again the proof does not proceed from the form as such but from the nature of the “act” of existence which flows to material things from their (material) forms. That is to say it is from the contingent nature of bodily existence. There is nothing more obvious than that bodies, though they have existence, are inherently bound to cease to exist at any time. They do not exist necessarily (which means they cannot cease to be) but contingently (which means they can cease to be).

Thus, since their very existence is not had from within themselves, if they do have existence, it must be from without. Here again one cannot go on indefinitely arguing to another being which itself is dependent in its existence. For, just as not everybody can be

a debtor, so there must exist some original thing that “owns” existence and therefore must be the source of the possession of it in those that do not. This thing of independent wealth of being will be understood as rich in a manner quite opposite to creditors in our experience, whose wealth, no matter how great, is inevitably finite. From a position of infinite wealth of existence no bestowal of existence upon others can possibly diminish the owner’s store of wealth.

This aspect of God in this proof confirms the unchangeability that was deduced in the first way. It may be noted, too, that the analogy passes to one of gift rather than loan where spiritual beings are concerned. For, such is the generosity of the owner/creditor that he does not intend that the “loan” be ever paid back (except in an act of gratitude).

It will be noted that in these two proofs, the concepts of motion or change and contingency strictly taken apply only to the physical and material order of things. Thus taken motion is the kind of activity or action proper to bodies. It is accidental and transitory. Some raise the objection that though the proof leads to an unmoved mover it does not necessarily lead to God. For the motion or change belonging to bodies is not to be found in purely spiritual beings (such as an angels, or spiritual souls).

Similarly, it may be argued that the concept of contingency used by St. Thomas is peculiar to corruptible bodies. He even uses the language of necessary being in reference to angels etc. Again this kind of contingency is not to be found in purely spiritual beings less than God. So it is not sufficient for a proof for the existence of God.

It may be said that these two arguments (the first and the third) are not complete without a further demonstration that there is a kind of change even in the order of spiritual creatures and that there is a kind of contingency also even there. Indeed, in regard to the proof from contingency St. Thomas seems to have to rely on an appeal to the second proof to complete it, by showing that the “necessity” of the existence of spirits is still a caused one and thus requires an uncaused cause to account for it.

However, though there are two stages involved it seems better to say that the notions of change and contingency, despite being taken from the material world, lead naturally by analogy to their extension to all created things. For there is motion or change in spiritual activity in as much as angels have thoughts and choices that do not belong to their substance. With regard to the notion of contingency, the angels’ substantial existence, though naturally necessary and everlasting (there being no intrinsic propensity for non-existence in it), is not absolutely necessary, as it is always dependent upon God. Taken in their full and extended senses, then, the two proofs lead to having to posit the existence of God.

When we come to the remaining three proofs, the notions from which we start, though also taken from the physical material world of our sense experience, have immediate metaphysical significance (extending to the spiritual). For the terms involved, efficiency (power), perfection (truth) and finality (goodness) are from the start analogous. To a Christian, indeed, they also are remote indications of the Trinity in God. Not that they

are rational proofs of the Trinity (which is not possible) but they are congruent with such truth given the knowledge we have from Faith.

We do not intend to go into the details of these three last proofs as this would make this article too long. They can be the subject of another essay/article. It is sufficient to notice that, like the other two, they lead to positing a being of absolutely opposite kind to those from which the argument proceeds; from dependence upon causality to independence; from imperfection in being to absolute perfection; from being essentially ordered to something beyond itself to being beyond all subordination.

In presentation these lines of ultimate explanation may cross over at times. But the lines of causality are clearly distinguished. They all involve a passage from the objects of our experience, having in some way or other the limitations of potentiality in their different forms of actuality, to a being that has no such limitation whatsoever. The general line of explanation in ultimate terms then ought to be upwards to the actualizing causal influences made so evident, rather than downwards into the depths of matter where, taken by itself, things only get more and more indeterminate and obscure. There is a “theory of everything” but the modern scientist is looking in the wrong place, and employing a means that has a different use.

One final point: The discovery of the ultimate explanation(s) for reality as we know it only enables us to accept as true the proposition that God exists. And the notion of God involved has to be taken though relation, and by way of opposition, to what comes within the range of our understanding. It does not mean that we have any insight into the inner nature of the divine being. The God of the philosophers remains an unknown God, a distant thing, someone personal no doubt, but beyond the possibility of our personal acquaintance.

Christian revelation changes all that. But, on the one hand, we have to be very careful to avoid the impression that we have by reason reached a knowledge of God as revealed by Faith. It is the same God but the proofs of his existence (and even providential governance) as the author of nature are quite distinct from the knowledge we have of God as the author of grace. On the other hand, the Christian can tend to disdain such an impoverished notion of God as is to be had by reason and consequently to deny the value of the proofs. This is a grave mistake. For it is the failure to promote the true lines of ultimate explanation, or the genuine “theory of everything”, that allows a materialistic and atheistic explanation to be presented (and almost universally accepted nowadays) as if it were the only one possible.

---