Fides et Ratio: Science and Faith in Complement

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Abstract

Grounding itself in Thomism, this paper seeks to explore the status quaestionis of the science and faith dialogue. It argues that faith and reason are both routes to knowledge through theological and scientific inquiry respectively. From this point of departure, it is proposed that faith and reason are partly related in the physical and natural sciences' limits when at these places metaphysical questions are posed. This is illustrated through cosmology, evolutionary theory, and quantum mechanics. Throughout, the author explores how the engagement of science and faith leads from reason beyond reason alone, and, within this epistemological whole, it is noted that faith complements reason in providing humanity with a fuller picture of reality.

> "... like the meridians as they approach the poles, so science, philosophy, and religion necessarily converge in the vicinity of the whole. They converge... but without merging, and never ceasing to attack the real from different angles and levels..." (Teilhard de Chardin, 1999: 2).

1. Introduction

Humans often perceive categorically, which can diminish their sense of reality (O'Murchu, 1997: 139).[1] Many scientists and people of faith adopt this approach, each group defending its own views, rather than attempting to integrate different worldviews. Currently, however, in light of contemporary science, humanity is challenged to remove dualisms in perceiving reality as a multilayered and complex whole. This research attempts to demonstrate that faith and science can complement one another, as they explore this whole, with an awareness of the dangers which categorisation of knowledge – while useful – can bring. With grounding in Thomism, the paper makes an attempt to clearly restate this perspective's *status quaestionis* on the science and faith debate.

2. Faith and reason

The mutual exclusivity of faith and science, popularly assumed, is not

supported by Saint Thomas Aquinas's theory that faith and science form a dynamic approach to the apprehension of knowledge. This is such because faith and science are placed within the greater discussion of faith and reason understood as different types of knowledge (Wallace, 2001: 443).[2]

For Aquinas, *faith* is that which has the formal object of *"... the First Truth"*, namely God, within which the action of belief has its end-point (1947: 1717-1718). Aquinas explains: *"... as in science we do not form propositions, except in order to have knowledge about things through their means, so is it in faith"* (1947: 1718). Faith is the possession of the intellect, fundamentally linked to the acquisition of truth, *"... the good of the intellect..."*, bringing the intellect to the object believed (Aquinas, 1947: 1719,1720). The contents of faith, however, are not perceivable, for all that is perceivable is the domain of science (Aquinas, 1947: 1721).

Reason, though, is *"... the way humans acquire knowledge through their natural powers of sense and intellect..."* without reliance on any other source (Wallace, 2001: 443-444). The reasonable means of knowledge acquisition involves development *"... from one thing understood to another, so as to know an intelligible truth"* (1947: 594).

What is illustrated in Aquinas's definitions of reason and faith is the *manner* in which knowledge is acquired, emphasised over the content proposed (Wallace, 2001: 444).[3] The two modes of knowledge acquisition are both rational, while the content of propositions made are unique to the different modes.

In a similar vein Saint Augustine of Hippo proposes:

> To believe is nothing other than to think with assent... Believers are thinkers: in believing, they think and in thinking they believe... If faith does not think, it is nothing.[4]

From a Scholastic point of view, then, there is a complex and dynamic relationship between faith and reason:

> "Faith asks that its object be understood with the help of reason; and at the summit of its searching reason acknowledges that it cannot do without what faith presents." (John Paul II, 1998: 37).

Through the arguments of these Scholastics it is possible to see how faith and reason are understood as intellectual pursuits, having their meeting in the human process of understanding reality. If this is the case, then all sciences which claim to make assent to truth are related in the human intellect: physical and natural science, human and social science, and so on.

While both science and faith originate in and examine reality, they pose different questions: science explores the "how" of reality, whereas faith seeks the "why". In engaging the "how" and the "why" in a relationship,

reason and faith provide the potential for the development of a more complete understanding.

3. The past togetherness of science and religion

Religion is part of human culture, within which all humans are situated, and indeed by which all are – at least partially – formed. Culture influences the way the world is perceived, as worldviews are influenced by religion, language, custom, etc. Thus, scientists, like everyone else, can never totally evade their socio-cultural context to achieve absolute objectivity in their investigations; rather they are influenced and formed by their cultural situatedness.[5]

The concept of subjective influence upon science might unsettle those who argue that physical and natural science is the only path to knowledge, thus excluding any metaphysical inquiry.[6] Yet this was not always so, as the history of physical and natural science illustrates.

4. The *separation* of mind and body

Following the scientific and technological advancements of the sixteenth century there occurred a *separation* of mind and body, as a result of the rift between scientific and metaphysical modes of inquiry. I propose that it was partially the process of the separation of physical and natural science from metaphysics (including faith) which was a contributory factor in the later separation of mind from matter. This, in turn, influenced the removal of Creator from creation, concluding in the severance of reason from faith. It is development of these dichotomies that I will now begin to examine, as I discuss the thought of Bacon, Descartes, and Newton.

4.1. Francis Bacon

For Aristotle, understanding could only arise when the causes of a particular entity under investigation were known.[7] This led him to identify the four causes, namely material, efficient, formal, and final causality.[8]

1. *Material causality* refers to *"... that out of which a thing comes to be and which persists..."*, for example, the wood out of which the desk that I sit at is made.[9]
2. The *efficient cause* (what results in potentiality being actualised, for instance, the desk I am sitting at was created by a carpenter who was the actualiser of the desk's potential to exist, from the material causes existent prior to their actualisation into a desk).[10]

3. The *formal cause* (the *"... essence of a thing..."*, that is what the subject actually is, for example, it is the idea of *desk* which I have in my mind, a universal idea, of which my desk is only a part as it has the quality of *deskness*).[11]
4. The *final cause* (*"... the purpose or goal of something..."*, such as the *telos* of the desk being for someone to sit and work at it).[12]

These categories correspond to a further Aristotelian distinction between *"substance"* (the object's *"... essence, its form, its definition, its whatness..."*) and *"accident"* (the matter out of which the object is made).[13]

Francis Bacon reacted to Aristotle's understanding of causation, by seeking clearly defined lines separating material and efficient causality from formal and final causality.[14] He argued that natural philosophy should be divided into physics and metaphysics to better study the discrete causal aspects, which he had identified: physics would engage with material and efficient causality, while metaphysics' pursuit would be formal and final causality.[15]

Bacon did not deny that formal causality was important, but argued that anything to do with *formal* causality should *"... be separated from questions regarding material causality."*[16] Metaphysics and physics should never be explored in the same study, because, for instance, a discussion of the *telos* of the aforementioned desk, its purpose, and so forth has nothing to do with physics, thus the former should not concern the physicist engaging in physical enquiries.[17]

We can trace in Bacon the separation between science and faith in the separation of physics and metaphysics: each was to focus solely upon the subject of its own particular investigations.

4.2. René Descartes

René Descartes used *methodic doubt* to remove all presumptions, assumptions, and so forth, which he believed had clouded Western thinking, to seek *"... an irrefutable basis for certain knowledge."* (Tarnas, 2000: 276).[18] In this process he concluded that there was one *fact* he could not doubt: the occurrence of doubt, which, like all thought processes, must have a cause, an "I".[19] Consequently, he concluded: *"Je pense donc je suis"*: while he could doubt everything else it was impossible to doubt that a thinker was thinking.[20]

The mind was distinct from physical reality, as a separation had been effected between the processes of mind and body (matter).[21] Descartes consequently subjected all reality to his dualism, viewing all outside the mind as separate and independent objects, both from the mind and from one another (O'Mahony, 2002: 6).[22]

The Cartesian understanding builds upon Bacon's divisions not only by separating modes of inquiry but also by further dividing the content of what is inquired: mind is severed from matter.[23]

4.3. Isaac Newton

From within the tradition of natural theology, Isaac Newton proposed: *"nam Deus ex operibus conoscitur"* (Newton quoted in McGuire, 1978: 118).[24] For Newton, God was the maker of a cosmos that functioned effectively through its adherence to embedded natural laws.[25] God was ascribed an active role in the cosmos, for the laws needed to be sustained so that the universe could function mechanistically (Barbour, 2000: 71.). Newton postulated Deism: the universe was created by God, but, once the laws of nature were in place, God withdrew, for the cosmos did not require God's intervention in its operation (Barbour, 2001: 71). Dualism evolved in Newton's proposal that the universe functioned as a clock, created and wound up at the beginning of time by God – the master-clockmaker – and, working as a machine in a regular manner, with no variation ever since (O'Mahony, 2002: 6). The idea of an intelligent designer-God *"... ended with a distant and impersonal God."* (Barbour, 2000: 71).

The dualist worldview influenced the way people regarded both science and faith: as God was separated from involvement in the universe, so faith was separated from what examines material reality, science.

Many Enlightenment philosophers embraced the concept of the deistic Clockmaker, eventually declaring atheism for God could not be considered to exist when science explained how everything in the material sphere occurred without divine intervention (Barbour, 2000: 71). Physical and natural science could thus develop through reason alone, free of faith's contamination (Barbour, 2000: 71). God was not only placed outside the universe, but was totally removed from it (Barbour, 2000: 71).

The extreme materialism propagated by some dualistic thinkers made particularly manifest in the traditions of Bacon, Descartes, and Newton, is challenged by many contemporary scholars. Supporting this challenge is the *new* cosmology, which points in the direction of metaphysics as part of reality (O'Mahony, 2002: 5).

5. The "new" story of the universe

The "new" story of the universe came into existence with the advent of twentieth century Cosmology and Quantum Mechanics. The first to grapple with this were the physicists, among them Einstein, who – it is reported – after hearing Georges-Henri Lemâitre explain his theory of the expansion of

the universe after the explosion of the primordial atom, declared: *"This is the most beautiful and satisfactory explanation of creation to which I have ever listened to"* (O'Mahony, 1993: 2).

5.1. An evolving cosmos

Central to the "new" story of the universe is the cosmos's existence within *evolution*.

Contemporary cosmology has improved our understanding of the nature of the cosmos by providing information about the age and size of the universe, its development, contents, and so on. Cosmology shows that our galaxy is one of about 100 billion galaxies comprising the universe.[26] The universe can be dated to between twelve to fifteen billion years since the occurrence of the "Big Bang".[27] Of course, we should not postulate this as the origin of all that is for created reality could have existed in a different form prior to the initial singularity.[28]

Still, it is generally held that the cosmos as we know it was created in an initial singularity, colloquially referred to as *"the Big Bang"*, evidenced by the continued presence of Cosmic Microwave Background Radiation (CMWBR).[29]

> Originating power brought forth the universe. All the energy that would ever exist in the entire course of time erupted as a single quantum – a singular gift existence. If in the future, stars would blaze and lizards would blink, these actions would be powered by the same numinous energy that flared forth at the dawn of time.... There was no place in the universe that was separate from the originating power of the universe. Each thing of the universe had its very roots in this realm (Swimme & Berry, 1992: 17).

All that exists – animate and inanimate – has emerged and developed from the nothingness that was to ever greater complexity and consciousness. Is there a dynamic behind this continuous process?

Darwinian *Natural Selection* refers to the survival of individuals of particular species, which share survival information with other members of the species, so that it can adapt to better exist within its context (1992: 237). Natural selection is evident: successful organisms adapt to their environments and share their DNA with their offspring (Peacocke, 2001: 73). Organisms that adapt, survive, while those that do not, die (Swimme & Berry, 1992: 120).

Orthodox Darwinians believe that the development of life is the result of *random* genetic mutations, yet Natural Selection appears to demonstrate the necessity behind evolution: only *well-adapted* species survive (Artigas, 2001: 115-116). Could natural selection be the product of much organisation? (Artigas, 2001: 116).

Upon examination of evolution, we note that at times random mutations occur, and with these mutations the tendency emerges for organisms to become ever more complex (Davies in Artigas, 2001: 121). What is the origin of new patterns in the cosmos, of new genetic mutations, and so on? (Davies in Artigas, 2001: 121) Exploration of the emergence of patterns in nature leads many to conclude that the cosmos appears self-organising as new and more complex patterns emerge, and as patterns functioning in an integrated way with one another contribute to the development of more complex patterns (Artigas, 2001: 124).

Some theists have proposed that the emergence of life from inanimate matter is evidence of the intervention of God in the cosmos. However, when considering the *self-organising nature* of the cosmos that resulted in life evolving, and patterns emerging, changing, the necessity for an external Divine Agent is removed (Peacocke, 2001: 70). There is no *"God-of-the-gaps"* required in explaining the emergence of life. This does not, however, imply that an Agent is not involved: the issue of causality remains, and hence a creative Agent could be working within, as part of the process of the evolution of patterns within the cosmos (Peacocke, 2001: 70).

Evidence suggests that the self-organising tendency of the cosmos towards greater complexity is a further dynamic of the evolutionary story, not working in opposition to natural selection but, coupled with the latter, providing a fuller explanation of the evolutionary process, beyond a single dynamic. Natural selection could be understood as part of the self-organising nature of the cosmos, too, for it is a process through which the cosmos organises life in terms of the extinction of organisms that do not adapt.

5.2. Quantum worldview

With the development of Quantum Mechanics, the classical conception of a material world ruled by fixed laws was challenged as "… there began to emerge a distinctive sense of an alive universe… everything seemed to connect, interact, and interrelate" (O'Murchu, 1997: 27).

Planck argued that radiation is not emitted in a continuous manner, but rather in "packets", which Einstein called: "quanta", that behaved at times as waves and at other times as particles (O'Murchu, 1997: 27). Quantum mechanics theorised a counter-intuitive understanding of reality, asserting that everything is more than initially perceived to be, with indeterminacy, ambiguity, uncertainty, and vagueness as its key features (O'Murchu, 1997: 28-29). Moreover, the quantum reality is relational, breaking down the classical distinction between the observer and the observed (O'Murchu, 1997: 33).

> … observation gives way to relationship, a complex mode of interacting, fluctuating between giving and receiving, until a sense of resonance emerges, whereby the individual parts (giver and receiver, observer and observed) lose their dualistic, independent identities, but rediscover a sense of the "quantum self" in the interdependent relationships of the new whole… (O'Murchu, 1997: 33).

The observer is always involved in a relationship with the observed, there is no distinction between them; hence, the observer influences the outcome of experiments, meaning that impartiality and objectivity are unactualisable ideals (O'Murchu, 1997: 30). The total objectivity highly prized by classical science is therefore an impossibility; at most the physical scientist can *aim* to be objective, as the ideal is impeded by the scientist's engagement in the scientific enterprise. Classical physics was altered even more when it was found that the way in which the wave-particle function collapses is dependent on what the observer of the collapse desires the outcome to be.[30] Wave-particle duality demonstrates that matter comprises energy and matter, rather than matter alone.

Quantum physicists have demonstrated that everything originated in a quantum vacuum, that is that particles emerge from seemingly empty space: from what was assumed to be nothing.[31] The "nothingness" of the vacuum is not nothing, however, for rather than being empty it is utterly full with the potential to bring all things into existence (O'Murchu, 1997: 102). At the most basic level of reality, in what was conceived as nothing, there is creative potential (O'Murchu, 2003: 43).

This nothingness, too, is part of physical reality. What was behind its existence? Why was it at all? A metaphysical explanation is needed for this metaphysical question.

6. Beyond science: possibilities

Polkinghorne argues that it is in attempting to answer questions like these at the boundaries of physical and natural sciences's exploratory powers that reason and faith have their meeting (2000: 159).

While science can describe reality, it fails when attempting to completely explain the reality it describes, as seen in our explorations of cosmology, evolutionary theory, and quantum physics. These limits arise when *meta-questions* come to the fore, questions which science does not have the ability to explain yet, while often more comprehensible answers to questions that transcend science are to be found in metaphysical theories (Polkinghorne, 2000: 160). *Meta-questions* concern causality, fine-tuning, and when these are raised – having no scientific answer – metaphysics

(often in philosophy and theology) can step in, for here are provided rational answers, emphasising reality's existence upon multiple planes, not only at the scientifically intelligible one (Polkinghorne, 1998: 112). It is the pursuit of physical and natural science that directs this discussion, but their findings direct the scholar to questions, which by their nature, demand metaphysical answers.

In his discussion of the "creative vacuum," Planck wrote:

> *"As a man of science who has devoted his whole life to the most clear headed science, to the study of matter, I can tell, as a result of my research about the atoms, this much:* there is no matter as such. *All matter originates and exists only by virtue of a force which brings the particles of an atom to vibration and holds the most minute solar system of the atom together… We must assume behind this force that existence of a conscious and intelligent Mind. This Mind is the matrix of all matter"* (Planck quoted in O'Murchu, 1997: 103).

Most religious traditions propose the existence of a Creative Divinity. But what is this Divinity, most often labelled as *"God"*? For matters of contextuality and conciseness I should like to keep this discussion within the context of Christianity. For many Christians, God is conceived as Creator of all, somewhat removed from creation and of the lived experience of creation, yet called upon to assist in times of need. Additionally, God is a person. Anthropological categories of understanding have been projected upon God for humans to understand God; these are the only frameworks of reference and understanding available. The "new science" challenges these images and, in response, many theologians, scientists, and philosophers are positing a new theology that speaks to contemporary science.

Classical theism presents us with a God characterised by His Oneness and His remoteness from the world, while some scientists, as we have seen, have imaged a Deistic God (O'Murchu, 2003: 78). Others, however, have developed theologies that include the *new* science, thus taking issue with classical images of God. Examples are the Process School and Panentheism. We will explore the latter.

> … pan-en-theism means that "all" (Gk. Pan) is "in" God (Gk. theos), but God is not exhausted by the world as a whole (G > W). As such panentheism attempts to steer a middle course between an acosmic theism, which separates God and world (G / W), and a pantheism which identified God with the universe as a whole (G = W) (Gregersen, 2004: 19).

The above definition shows the balance panentheists desire between the transcendence and immanence of God: the cosmos is seen as contained in God, but God is not exhausted by the cosmos, being more-than the cosmos (Gregersen, 2004: 19-20). God is the reality within which all reality exists,

yet more than material reality for God includes all that exists within God and which receives existence from God (Peacocke, 2001: 139). Peacocke proposes that in classical theology God was seen as transcendent, a God who created reality from outside of God's own existence, which is in contrast to the panentheistic understanding of God who creates reality *"within herself"* (2001: 139).

If God as Creator is proposed to exist, evident creativity (such as evolutionary randomness) has to be conceived in light of the scientific accounts of reality just described, which shed new light upon the self-creativity of creation (Peacocke, 2004: 142). The self-creating processes impress upon us the need to re-conceptualise God the Creator as *immanent* within these processes, yet since God cannot be proposed as the direct cause of the products of these processes, the place where God's creativity is evident is as the *cause of* the processes that are endowed with creativity (Peacocke, 2004: 143,145). The natural processes as created entities are contingent, and hence God can be imaged as continuously sustaining the processes in being (Peacocke, 2004: 145).

When contemporary science is considered in conjunction with the panentheistic tradition of Eastern Christianity, in particular, it is evident that:

> Our primary image should be that of indwelling. Above and beyond creation, God is also its true inwardness, its 'within' (Ware, 2004: 159).

Here, a manner in which Divine immanence is imaged is in the fourteenth century Greek monk, Saint Gregory Palamas's concepts of *"ousia"* (the transcendent essence of God) and *"energeiai"* (the action of God immanent in creation) (Ware, 2004: 160). God's *"ousia"* speaks of the transcendence of God from creation, for God is neither created nor understandable (Ware, 2004: 160). *"Energeiai"* is the Divine giving of being through the processes of creation (Ware, 2004: 160).

> We claim to know our God from his energies (*energeiai*), but we do not profess that we can draw near to his essence (*ousia*). For his energies come down to us, but his essence remains inaccessible (Saint Basil of Caesarea quoted in Ware, 2004: 161).

In panentheism, God is imaged as transcendent and immanent (Ware, 2004: 161). Palamas proposes a paradoxical conclusion to the ontology of God:

> He is both existent and non-existent, he is everywhere and nowhere; he has many names and he cannot be named; he is ever-moving and he is unmoved and, in short, he is everything and nothing (Saint Gregory Palamas quoted in Ware, 2004:162).

God's being is completely within God, but all created entities are also within this reality (Ware, 2004: 162). God too, is present in all created things

through God's *energeiai*, yet still *"Peter is Peter, Paul is Paul, Philip is Philip. Each one retains his own nature and personal identity…"* (Macarius in Ware, 2004: 164). While union occurs between God and creation the identities of neither are absorbed by the other: essences remain (Ware, 2004: 164). God is entirely present in God's *energeiai*, meaning that, through God's energies, God becomes wholly present within creation (Ware, 2004: 165). The transcendent nature of God, rooted in God's *ousia* emphasises the ontological difference that exists between God and the creation, for while God's energies are present throughout the creation containing God in God's entirety, God's *ousia* is always preserved, as God is completely unknowable (Ware, 2004: 166).

Contemporary physical and natural science offers faith the challenge to re-image God in light of the *new story*. From current science we may analogically understand God as the dynamic, creative, originating energy that caused the *initial singularity*, that is always present in the energy that underlies all that is. The panentheistic argument given is but one manner in which the anthropomorphic God can be re-imaged, and in which science and theology are found to be in harmony.

7. Critique

The dialogue between science and faith has been much criticised, hence, no examination of the topic would be complete without an examination of some points of critique.

7.1. The reaction of materialists

Stephen Jay Gould was a materialist Darwinian who argued that religion (as a custodian of faith) and science should remain absolutely separate, as he saw no relationship between them as, in his view, they are magisteria that investigate different aspects of reality.[32] Gould saw science as completely objective: he proposed that when the scientist enters science, he/she must set-aside cultural situatedness and religious beliefs.[33] But, surely this is an impossibility: how can one be completely objective when one cannot remove oneself from one's context? The most that can be aimed for is an ideal of objectivity, while still existing within a particular socio-political-religious context. As it is impossible for human beings to totally separate diverse aspects of their experience I suggest that Gould's critique is weakened. Since they are part of the same human experience, it is not possible to completely separate religion (and by extension, faith as its contents) and science.

Richard Dawkins has suggested that faith should be completely eliminated from human experience, as religion proposes an alternate

account of reality to that of science, and as such competes with science to explain reality, giving an understanding that is both irrational and unrealistic (Barbour, 2000: 155).[34] Dawkins further proposes that religion makes claims about the same aspect of reality as does science, for *"religions make existence claims, and this means scientific claims."*[35] But, if religion makes claims about existence, that is metaphysical claims about the nature of reality, is this not the nature of claims that should be made by a pursuit such as religion, with fundamentally metaphysical proposals? Furthermore, it is beyond the boundaries of science to make claims concerning the nature of reality, as science's task is to investigate the processes of creation and not to make metaphysical claims about reality, which transcend its method and scope.

Dawkins's bias against religion is evident in his sometimes extreme claims, as evidenced above, and indeed, in the following statement:

> … I think a case can be made that faith is one of the world's great evils, comparable to the smallpox virus but harder to eradicate.[36]

Faith, for Dawkins, is not rooted in evidence and is irrational when compared to science, the difference between science and religion being that science is based upon logically interpreted empirical evidence, while religion makes no use of evidence or logic; it is irrational.[37]

What "faith" is Dawkins considering? This is not the faith proposed by Scholastic thinkers considered in this study, such as Augustine, Aquinas, and John Paul II, by whom faith is always understood as a search for understanding (Polkinghorne, 1996: 28). The faith these philosophers sought aimed to be rational, and, when irrationalities arose, they were pondered over rationally. The *rational*-faith tradition counters Dawkins' argument that faith is necessarily irrational by carefully conceiving what faith is. Moreover, it should be noted that since the ontology of the Creator is not the same as that of humanity, God is not plainly evident through empirical observation, but when investigated using other, equally effective, epistemological tools, for instance metaphysical speculation in the answering of meta-questions, evidence for a cause arises. Dawkins's arguments against faith are rooted in false understanding and strong prejudice, and since they do not concern faith as here cogently defined, his critique is, I propose, weakened.

7.2. Creationists' opposition

There are also those who, for the sake of their religious beliefs, oppose the dialogue between science and faith. Most vocal are biblical literalists (labelled as "Creationists" for their literal interpretation of the Genesis creation stories), who argue that the universe was created by God in six

days. Creationists deem that there is no room for variation to the creation stories: creation followed day-by-day, exactly according to the Genesis account, although that there are conflicting accounts of creation in Genesis seems to be ignored.[38] Creationists reject evolutionary theory, viewing it as anathema, an insult to Divine revelation.

In his letter to George Coyne, John Paul II takes issue with the Creationists' position.[39] In speaking about the development of scripture as a parallel to the development of theology, John Paul explains:

> If the cosmologies of the ancient Near Eastern world could be purified and assimilated into the first chapters of Genesis, might contemporary cosmology have something to offer to our reflections upon creation?[40]

There are striking resemblances between the Ancient Near Eastern creation narratives – for instance the Babylonian *Enûma Eliš* – and *Genesis*.[41] If it is, as Pope John Paul argued, that the *Genesis* creation stories were influenced in their formation by other Ancient Near Eastern creation narratives, then the argument for literal interpretation of these narratives flounders for the issue of the authenticity of scriptural revelation comes to the fore. It is the surety that God revealed in the Scriptures the manner in which creation occurred that forms the cornerstone of the Creationists' belief in the literal interpretation of the Judaeo-Christian Scriptures. If biblical scholars are correct, scriptural revelation in *Genesis* does not come solely from the Divine, but, at least partly, from the people of the surrounding Ancient Near East. The Creationists' argument is thus lacking in evidential support for their holding fast to a literal interpretation of the *Genesis* creation narratives.

8. Conclusion

Despite the vast achievements of science, much is still to be discovered about the cosmos within which humans find their being. In both explanation and mystery, humans feel awe – the feeling of the philosopher, according to Plato (2008: 118). I contend that if faith and reason – as two paths to knowledge of reality – reveal in metaphysical and physical & natural science both the why and the how of the cosmos, humans are better able to gaze in awe at the multilayered reality itself. In reducing reality through our explanations only to faith or reason, we ultimately do violence to reality rather than exploring it in the fullest possible way.

> Science can purify religion from error and superstition; religion can purify science from idolatory and false absolutes. Each can draw the other into a wider world, a world in which both can flourish *(John Paul II, 1988).*

1. Enlightened by his exploration of quantum mechanics, Diarmuid O'Murchu brings the notion of wholeness to his discussion on human perception (1997: 140). O'Murchu argues that labelling (thus, categorising) aspects of reality results in *"...partial explanation*[s] *of what is usually a complex condition, demanding not one, but several frames of reference"* (1997: 139-140).

2. In *Super Boethium De Trinitate*, Question II, Article 1, Aquinas argues that there are two modes of human reasoning: firstly what may be deemed as reasoning (that which is *"... demonstrative, forcing the intellect to believe..."*), and secondly that form of reasoning the contents of which cannot be reasoned about in the first mode's manner, namely faith (1946). But, Aquinas argues, this second form of reasoning is no less to be seen as a means of science, for, in Question II, Article 2, it is stated: *"... since the essence of science consists in this, that from things known a knowledge of things previously unknown is derived, and this may occur in relation to divine truths, evidently there can be a science of divine things"* (1946). In Article 1 of the same Question, it is proposed that while reason is not able to prove articles of faith, *"... neither can these same truths be demonstratively disproved. Moreover, if this kind of reason could lead to a proving of those things which are of faith, it would deprive man of the merit of faith, because then assent would not be voluntary, but necessary"* (1946).

3. *"Sacred doctrine is a science... there are two kinds of sciences. There are some which proceed from a principle known by the natural light of intelligence, such as arithmetic and geometry and the like. There are some which proceed from principles known by the light of a higher science: thus the science of perspective proceeds from principles established by geometry, and music from principles established by arithmetic. So it is that sacred doctrine is a science because it proceeds from principles established by the light of a higher science, namely the science of God..."* (*Summa Theologica*, First Part, Question 1, Article 2) (1947: 3-4). Aquinas further explains that the *"sciences are differentiated according to the various means through which knowledge is obtained... Hence there is no reason why those things which may be learned from philosophical science, so far as they can be known by natural reason, may not also be taught us by another science..."*, for example, theology (*Summa Theologica,* First Part, Question 1, Article 1) (1947: 3). Also in the *Super Boethium De Trinitate*, Aquinas states: *"... knowledge of sensible things serves as the principle for coming to a knowledge of the divine; and it was in this way that the philosophers handed down a traditional science of divine things, calling first philosophy a divine science. The other mode is according to that of divine things themselves as they are understood in themselves"* (1946).

4. *On the Predestination of the Saints,* Book 1, Ch. 5. This text was quoted by John Paul II within his discussion of some requirements made on philosophy by theology (1998:68-69). Arguing for a unified conception of truth, John Paul proposed that reason – as a means to acquisition of truth – needs to always *"... question and be questioned..."* for truth to be acquired without either approach being absolutised (1998: 68).

5. Pine, 2003.

6. Stephen Hawking's recently published work, *The Grand Design* (2010, Bantam Press), has caused quite some furore in science and religion circles for arguing that God is no longer necessary as a result of physical laws. The infamous *God Delusion* of Richard Dawkins (2006, Transworld Publishers) does similar, although from an evolutionary perspective.

7. *"... men do not think they know a thing till they have grasped the 'why' of (which is to grasp its primary cause)"* (Aristotle, *Physics,* Book II, Part 3).

8. These are discussed by Alam in his explanation of the Baconian refutation of the Aristotelian theory of causality (2004).

9. *Physics,* Book II, Part 3.

10. In *Physics,* Book II, Part 3, Aristotle proposes that the *"efficient cause"* is *"... the primary source of the chance or coming to rest, e.g. the man who gave advice is a cause, the father is cause of the child, and generally what makes of what is made and what causes change of what is changed."*

11. Aristotle explains that the *"formal cause"* is *"... the form or the archetype, i.e. the statement of the essence, and its genera..."* (*Physics,* Book II, Part 3).

12. *"... in the sense of end or 'that for the sake of which' a thing is done, e.g. health is the cause of walking about... The same is true also of all the intermediate steps which are brought about through the action of something else as means towards the end, e.g. reduction of flesh, purging, drugs, or surgical instruments are means towards health. All these things are 'for the sake of' the end, though they differ from one another in that some are activities, others instruments"* (Aristotle, *Physics,* Book II, Part 3).

13. Alam, 2004.

14. Alam touches on Bacon's reaction to Aristotle's causes (2004). For Bacon, *"there are and can exist but two ways of investigating and discovering truth. The one hurries on rapidly from the senses and particulars to the most general axioms; and from them as principles and their supposed indisputable truth derives and discovers the intermediate axioms. This is the way now in use. The other constructs its axioms from the senses and particulars, by ascending continually and gradually, till it finally arrives at the most general axioms, which is the true but unattempted way"* (*Novo Organum,* 19).

15. Alam, 2004.

16. Alam, 2004.

17. Alam, 2004.

18. *"I realized that if I wanted to establish anything in the sciences that was stable and likely to last, I needed... to demolish everything completely and start again from the foundations"* (Descartes, *Meditations on First Philosophy,* First Meditation, 2007b:1).

19. *"... what am I? A thing that thinks. What is that? A thing that doubts, understands, affirms, denies, wants, refuses, and also imagines and senses"* (Descartes, *Meditations on First Philosophy,* Second Meditation, 2007b: 5).

20. *"... while I was trying in this way to think everything to be false it* had *to be the case that I, who was thinking this, was something. And observing that this truth* ***I am thinking, therefore I exist*** *was so firm and sure that not even the most extravagant suppositions of the sceptics could shake it, I decided that I could accept it without scruple as the first principle of the philosophy I was seeking"* (Descrates, *Discourse on the Method,* Part 4, 2007a:15).

21. *"... the fact that I can vividly and clearly think of one thing apart from another assures me that the two things are distinct from one another – that is, that they are two... So my mind is a distinct thing from my body"* (Descartes, *Meditations on First Philosophy*, Sixth Meditation, 2007b:29).

22. *"There is a great difference between the mind and the body. Every body is by its nature divisible, but the mind can't be divided. When I consider the mind – i.e. consider myself purely as a thinking thing – I can't detect any parts within myself; I understand myself to be something single and complete... By contrast, any corporeal thing can easily be divided into parts in my thought; and this shows me that it is really divisible. This one argument would be enough to show me that the mind is completely different from the body..."* (Descartes, *Meditations on First Philosophy, Sixth Meditation,* 2007b: 32).

23. Bacon does not appear to separate the subject of the investigation. Rather he separated the modes of investigation whereas Descartes took that separation further bringing it into the realm of the essence of subjects, separating united subjects into independent objects, as he did with the mind and body of the human.

24. *"For God is known from his works"* (Newton translated by and quoted in McGuire, 1978:119).

25. *"This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful Being... This Being governs all things, not as the soul of the world, but as Lord over all... He is eternal and infinite, omnipotent and omniscient... He is not eternity or infinity, but eternal and infinite; he is not duration or space, but he endures and is present... Since every particle of space is* always*, and every indivisible moment of duration is* every where*, certainly the Maker and Lord of all things cannot be* never *and* no where... *God suffers nothing from the motion of bodies; bodies find no resistance from the omnipresence of God*" (Newton, *Principia,* 1846:504-505).

26. Stoeger, 2004.

27. Stoeger, 2004.

28. Stoeger, 2004.

29. Stoeger, 2004.

30. This is the *Copenhagen Interpretation of Quantum Mechanics*, a view of reality which has the potential to become manifest in different ways depending upon that which the observer desires (O'Murchu, 1997: 30). There are other interpretations, too, such as that of the *Many Worlds*, the *Ensemble Interpretation*, *de Broglie-Bohm theory*, and so on.

31. Swimme, 1997.

32. *"The net magisterium of science covers the empirical realm: what is the universe made of (fact) and why does it work this way (theory). The magisterium of religion extends over questions of ultimate meaning and moral value. These two magisterial do not overlap, nor do they encompass all inquiry (consider, for example, the magisterium of art and the meaning of beauty)... science studies how the heavens go, religion how to go to heaven"* (Gould, 1999: 6).

33. Henderson, 1986.

34. Science disproves religion and so belief in God should be rejected for *"... God almost certainly does not exist"* (Dawkins, 2006: 158).

35. Dawkins, 1988.

36. Dawkins, 1997.

37. Dawkins, 1997.

38. cf. *Genesis* 1:1-2:3 and *Genesis* 2:4-25.

39. George V. Coyne, S.J., was director of the Vatican Observatory from 1978 – 2006.

40. John Paul II, 1988.

41. Leonard William King's 1902 translation of the *Enuma Elish* (taken from *"The Seven Tablets of Creation"*) is available online: http://www.sacred-texts.com/ane/enuma.htm.

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