Omega II (2003)1, 7-30

The God Who Reveals The Book of Nature and The Book of Scripture As Read by Kepler, Galileo, Newton, Einstein, and Davies

- Job Kozhamthadam¹

The God of love is a God who reveals in deed and word, through the Books of Nature and Scripture. The relationship between this age-old pair reflects the relationship between science and religion. This paper studies how some eminent scientists tried to read these books and what impact this reading had on each one. Kepler found perfect harmony and integration between the two books. Galileo never fully succeeded in integrating them, but it was quite clear that this noble task had been his great ambition. The reading of the Book of Nature brought Newton face to face with its author. Einstein arrived at his God of Super-Reason through his reading of the Book of Nature. Modern science's capability and success in reading this book leads Davies to claim that science offers a surer path to God than religion. The paper concludes that the theme of the Books of Nature and Scripture, despite its antiquity, still retains much relevant to our science-dominated world.

- Editor

Introduction

Perhaps the best attempt at defining the indefinable concept of God was done by St. John the Evangelist when he said, "God is love." Love indeed captures many fundamental aspects of our intuitive understanding of God. Although love itself defies all attempts at an exact definition, all agree that genuine love can never be self-centered or just inward-looking; true love is always other-centered, always open, never secretive. The lover shares whatever he/she has with the beloved, and finds joy and fulfillment in this sharing. The mystery of love is that in enriching the beloved the lover himself/herself gets enriched.

A God of love cannot but reveal himself/herself. History informs us that humans were well aware of this point right from the dawn of civilization, and kept themselves open and alert to this divine selfdisclosure. They believed that God revealed not only by word of mouth, but also by deed of hands. Accordingly, two forms of religion arose: the one called "religions of the Book," which emphasized the verbal revelation, and the other called "cosmic religions," which focused on the revelation through nature or the cosmos. Judaism, Christianity, Islam, and some of the Eastern religions belong to the latter.

The twin mode of divine self-disclosure is often expressed metaphorically in terms of the Book of Nature and the Book of Scripture. Since science involves the study of the Book of Nature and theology or, more specifically, scriptural theology involves the study of the Book of Scripture, the relationship between these two books represents the relationship between science and religion. It seems to me that the fortunes of the relationship between these two books, and hence between science and religion, have fluctuated with the attitude people have had towards material nature: a negative outlook towards nature led to a belittling of science, resulting in a souring of its relationship with religion.

The Old Testament, particularly the Book of Genesis, had a positive attitude towards nature, as is evident from the well-known creation narrative. While talking about the creation of the different constituents of the universe, the statement "God saw how good it was" recurs as a refrain again and again, culminating in the final positive note "God looked at everything he had made, and he found it very good." (Gen 1:31). The message is loud and clear; the universe with all its creatures is God's masterwork, and it is good in every way.

The revelatory role of the material universe too is conspicuously clear in the Old Testament, particularly in the Psalms. "The heavens declare the glory of God and the firmament proclaims his handiwork." (Ps. 19:2). Again, "The heavens proclaims his justice and all peoples see his glory." (Ps. 97:6). Indeed the Lord speaks to us through nature: "The voice of the Lord is over the waters, the Lord of glory thunders, the Lord, over vast waters." (Ps. 29:3). Finally, the Psalmist extends an open invitation to all creation: "Let the heavens be glad and the earth rejoice; let the sea and what fills it resound; let the plains be joyful and all that is in them! Then shall all the trees of the forest exult before the Lord, for he comes; for he comes to rule the earth." (Ps. 96:11-13). All these passages and many more like them leave no doubt that the Lord reveals in and through nature.

But this positive biblical outlook towards nature began to fade out in course of time, particularly in the early Middle Ages, thanks to the influence of Gnosticism, Platonism, and Neoplatonism, to the detriment of science. Almost equating the material universe with an incarnation of evil, the Gnostics could see nothing positive or salutary in it. In their eagerness to extol the spiritual, they looked upon the cosmos as "a disastrous mistake, the scene of disorder and sin, the product of evil forces, the antithesis of the divine, and a prison from which the soul must escape in order to make its way to its true home in the spiritual realm."² Platonism and Neoplatonism, although less pessimistic, also failed to possess a positive attitude towards the material universe, reducing it to a mere shadow of the superior world of Ideas.

The Christian tradition in the Middle Ages was very much influenced by the forces that disparaged nature and the study of nature, although as Lindberg points out, "orthodox Christianity, as it developed, emphatically rejected the extremes; nature was neither to be worshipped nor to be repudiated."³ For instance, St. Augustine, despite his life-long commitment to the pursuit of solid knowledge, wrote in Enchiridion:

When it is asked what we ought to believe in matters of religion, the answer is not to be sought in the exploration of the nature of things, after the manner of those whom the Greeks called 'physicists.' For the Christian, it is enough to believe that the cause of all created things, whether in heaven or on earth, whether visible or invisible, is nothing other than the goodness of the Creator, who is the one and the true God.⁴

The widely accepted Christian position was that the material universe is God's creation, is temporary and transitory; it can never be an end in itself but only a means to be used for attaining the supreme goal of one's own salvation and sanctification. The world is a valley of tears in which we are only pilgrims on our way to the true home in heaven. Since science is the study of the material universe, this attitude, though far from being pessimistic, failed to inspire much encouragement for its pursuit. No wonder, this period, though not barren as far as scientific achievements are concerned, saw very few outstanding scientists, and contributed minimally to the development of science. It seemed that the Book of Nature had gone into a period of hibernation during this period.

On the other hand, this period saw the Book of Scripture attracting much attention. The Fathers of the Church and other scholars made substantial contributions to scriptural scholarship. Scriptural authority was widely established, and scriptural norms and principles were used in various walks of life. Scriptural claims became almost synonymous with truth claims. If, on the one hand, this period found the interest in the Book of Nature at its nadir, on the other, it also saw the interest in the Book of Scripture at its zenith.

However, with the advent of modern science from the sixteenth century onwards a more balanced attitude towards both these books began to emerge. We now proceed to discuss the approach some of the eminent scientists in history like Kepler, Galileo, Newton, Einstein, and Davies took towards these two books, and what relationship they found between the two.

Johannes Kepler (1571-1630)

Perhaps Kepler gives the most balanced and integrated view of the relationship between the Book of Nature and the Book of Scripture. Far from having any uneasy tension, the two books harmonized beautifully and fruitfully in his life and works.

All through his life Kepler had a very positive view of the material

universe. Unlike many of his contemporaries, he looked upon it as something sacred, having a divine origin. He expressed this in a letter to Herwart von Hohenburg, his patron and friend, written on April 10, 1599; "The world is the corporeal image of God, whereas the soul is the incorporeal, though created, image of God."5 According to him, the material world is the image of God become tangible, taken concrete shape, while the world of spiritual beings is the image of same God in the incorporeal form. In another place he referred to the universe as the "bright temple of God."6 Involvement in the world was not a burden imposed on the human race in the Garden of Eden. Indeed, he believed that the universe and involvement in it through scientific research was his sure means to reach heaven.⁷ As he wrote to his astronomer-friend David Fabricius, for him nature aspires to divinity.8 Furthermore, according to him, God ordained that the universe act and operate by the same laws as his: "As God the creator played, so he also taught nature, as his image, to play; and to play the very same game he played for her first ,..."9 The positive outlook he had toward the created world rendered his scientific work meaningful and purposeful.

He saw the reflection of the three divine Persons of the Holy Trinity in the material universe. The spherical universe of ours is an image of the Triune God; "The sphere possesses a threefold quality: surface, central point, intervening space. The same is true of the motionless universe: the fixed stars, the sun and the aura or intermediate ether; and it is also true of the Trinity: the Father, Son, and Holy Ghost."¹⁰ This is about the motionless universe. A similar relationship exists in the case of the mobile universe as well. The mobile universe for him is made up of the sun and the known planets of the day.

The sun in the middle of the moveable, being immoveable itself and yet the source of motion, bears the image of God the Father, the creator. Now what creation is to God, so is motion to the sun. Thus it moves [the bodies in the space within] the fixed stars, just as the Father creates in the Son Again the sun disperses a moving power through the medium in which are the moveables, and in just this way the Father creates through the Spirit or through the power of the Spirit.¹¹ Thus the general structure of the universe is modeled after the Trinitarian God. Just as the Trinity has three distinct, yet intimately related parts and neither can be complete without the other, the universe too has three parts which are intrinsically interrelated.

Is the similarity just a heuristic one, just an analogy designed to make the mystery of the Trinity intelligible to simple people? Kepler certainly wanted to make the mystery as intelligible as possible, but the Trinitarian model, far from being a figment of the imagination for heuristic purposes, is an archetype of the universe, a real blueprint of the universe. In his own words, "Nor should it be taken as a meaningless resemblance, but it should be reckoned as one of the causes, as a form and archetype of the universe."¹² According to him, the universe does literally have a Trinitarian structure.

The revelatory role of nature Kepler expressed in terms of the Book of Nature. According to him, nature is a sacred book with a sublime message to all humankind. As he put it in the *Epitome*, "This is the very Book of Nature in which God the creator has proclaimed and depicted his essence and his will toward man in part and in a certain wordless kind of writing."¹³ Just as we can come to know the personality and greatness of an author through his/her book, we can come to know God through the Book of Nature. In fact, God himself "wishes to be known through this Book of Nature."¹⁴

The specialty of his interpretation of this theme consisted in relating the Book of Nature to the Book of Scripture in an original way. He placed them on a par. Both are aspects of one and the same reality, complementing each other, and thereby giving humans a further and more complete manifestation of God. He argued that since God has mouth and hands, God reveals through both, the word of God proceeding from mouth and the deed of God from hands. The Book of Scripture recounts the word of God, whereas the Book of Nature the deed of God. Hence both are sacred, both are worthy of our total respect and attention. This conclusion has an extremely significant consequence: science, which is the study of the Book of Nature, becomes a profession very analogous to Scriptural theology. Thus this theme is at the basis of his perception of the nobility of science. This idea in a way revolutionized his whole life, providing it with a new direction. To be a priest of God in the Lutheran Church was his great ambition. But the perception of the full significance of the Book of Nature transformed his life vocation, because he realized that he could be both a priest of God and an astronomer.

The Sacred Character of Astronomy

It was obvious to Kepler that if the Book of Nature was something sacred, then the study of nature had to be something sublime, just like the study of Scripture. For a person to whom the universe was the "sacred temple of God" this conclusion had to follow, since astronomy was nothing but the study of this sacred temple. But the theme of the Book of Nature elevated astronomy to an even higher plane. It was not just the study of the temple or abode of God, it became the study of God himself manifested in and through nature, just as the study of the Book of Scripture is not just the study of God's verbal communication, but also of God himself communicating to us. He affirmed this sacredness again and again in his writings. For instance, in the *Astronomia Nova* he asserted that it was "the divine voice that calls humans to learn astronomy."¹⁵

Astronomers Are Priests

One of the direct consequences of placing the Book of Nature and the Book of Scripture on a par with each other was that, for Kepler, astronomers became priests of the Almighty. Just as ordinary priests are ministers of the Word of God, astronomers are ministers of the Deed of God. Ordinary priests give glory to God by expounding the mysteries in the Book of Scripture, whereas astronomers do the very same by explaining the mysteries in the Book of Nature. He emphasized this conviction repeatedly in his correspondence with friends: "Indeed I am of the opinion that since astronomers are priests of Almighty God with respect to the Book of Nature, we should concern ourselves not with the praise of our cleverness but with the glory of God."¹⁶ This was no merely pious statement, as far as he was concerned. Nor was it offered as a rationalization to justify to him and to his relatives and friends his decision to discontinue his pursuit to become a Lutheran priest. He really meant it, as was evident in the way he lived out his conviction; with the zeal of a priest-missionary, he fully dedicated himself to astronomy with utter selflessness. Even in his most mature age he remained faithful to this conviction, as could be seen from the fact that he wanted the *Epitome* to be interpreted as a hymn that he composed as the "priest of God at the Book of Nature."¹⁷

Furthermore, this conviction defined the goal of science or astronomy for him. The aim of science was to discover the plan of God, the thought of God, not to play God over nature, not to have power over nature so as to control it, as Francis Bacon would have it. It was to discover in this plan God's great wisdom and love for humankind so that we can praise the Divine Majesty all the more.

Kepler and Scriptural Interpretation

The integrated view Kepler had about the relationship between the two books helped him to develop a new way of interpreting Scripture, thereby avoiding any serious conflict between the scientific and scriptural views. The influence of Kepler's scientific ideas on his religion was most conspicuous in his new outlook on scriptural interpretation. The specific problem confronting Kepler was how to reconcile astronomy, specifically the Copernican astronomy, with the Bible. He was caught up in a difficult dilemma: on the one hand, he was convinced that the Copernican system was true. On the other hand, he had no doubt about the veracity of the Bible. But there were many passages in the Bible which seemed to contradict the Copernican position. How could such a contradiction arise? How could one truth contradict another on the same issue? Could a rational God allow such a situation? Kepler put the conflict in another way also. God had both tongue and hands (fingers). The Holy Book was the word of God, the work of his tongue. The Book of Nature was the deed of God, the work of his hands. Insofar as astronomy was the study of this Book of Nature, true astronomical laws were nothing but laws governing the works of God's hands. To say that astronomy and the Holy Scripture contradicted each other was tantamount to denying any coordination between God's tongue and hands. Since such could never be the case, he concluded: "Therefore in matters which are

quite plain everyone with strong religious scruples will take the greatest care not to twist the tongue of God so that it refutes the finger of God in nature."¹⁸ Obviously, Kepler's dilemma was one of finding a rational way to bring about a reconciliation between two truths deepest to his heart; the veracity of the Bible and that of the Copernican system.

Basically Kepler's solution was as follows: there could not be a real conflict between scientific truth and scriptural truth. The contradiction was only apparent, not real. It arose because of a literal interpretation of Holy Scripture. He advocated a nonliteral interpretation, especially in passages where Scripture talked about scientific issues. In this way his scientific views and his faith in the ability of science to reveal truths about nature moved him to argue for a nonliteral interpretation of Scripture.

Although he always remained respectful towards the word of God, he argued that it had to be interpreted in the light of scientific findings. In this context he subscribed to the accommodation theory of interpretation of the Bible, according to which God in revealing to humans accommodated his language and expression to the people he revealed to and to the purpose he had in mind. As Kepler wrote to Herwart, the inspired writers of the Bible used the ordinary language and concepts of the day to communicate God's message, "not for linguistic accuracy, but for the sake of conversing and communicating his message."¹⁹ The accommodation theory argues that we must recognize that there is a real distinction between what is said and how it is said. On the other hand, a literal interpretation denies such a distinction and identifies what is said with how it is said.

In opposition to many Lutheran theologians of his day who looked upon the Bible as a textbook of astronomy, he argued that the purpose of the Holy Book was not to teach astronomy, but moral conduct. According to him, except for the first chapter of Genesis, the Holy writ was not meant to instruct humans in natural science. The Bible wanted to take the believers to a higher level of morality, not to the level of the study of the planets and stars. "For astronomy discloses the causes of natural phenomena and takes within its purview the investigation of optical illusions. Much loftier subjects are treated by Holy Writ"²⁰ As an illustration, Kepler referred to the Book of Job, chapter 38, where God talked of the creation of the world. Although this passage referred to topics ordinarily dealt with in astronomy, it was not an astronomical (scientific) analysis on how the earth and things in and around it had been formed. The purpose of this passage was to remind humans of the supremacy of God over all creation, to remind them of their ignorance, and to recall them to humble submission to and reverence for God, the Master of all creation.

How about the passages in the Bible often quoted by the opponents of Copernicus? He argued that the principles developed above could show that these passages did not contradict Copernicanism. The most frequently quoted one was from Joshua 10:12-13: "Sun, stand thou still at Gibeon, and thou Moon in the valley of Aijalon. And the Sun stood still, and the Moon stayed, until the nation took vengeance on their enemies." The usual argument (in Kepler's day) had been that if the sun were stationary, it was pointless for God to order it to stop moving in answer to Joshua's prayer. According to Kepler, the leader of the Israelites was not speaking as an astronomer, he was using the language of the people. God on the other hand understood what Joshua wanted and granted it. "The sum of Joshua's prayer came down to this that it might so appear to him, regardless of the reality; to be sure, the appearance was not groundless and invalid but was related to the desired effect."21 He continued: "Thoughtless people consider it only a contradiction of words: 'the Sun stood still,' and 'the Earth stood still.' They do not consider that this contradiction arose only within the boundaries of optics and astronomy, and for this reason it does not extend to common usage."22 Definitely in astronomy it was important to know which one stood still, but in ordinary conversations such distinctions were immaterial. The relevant question was 'what does the author intend?' The conclusion he wanted to draw was clear: if the Bible was a book on astronomy and if Joshua was speaking as an astronomer, then there was a serious problem, and the Joshua passage could be taken as a refutation of the Copernican system. But the conditionals were not true.

Kepler's arguments are quite persuasive. However, there are serious difficulties with his view. His position implies that some passages of the Bible are to be taken nonliterally, whereas some others literally.

But how do we know which one is to be taken nonliterally and which one literally? Kepler would not want to say that all passages referring to scientific issues should belong to the first category because he himself gave the first chapter of the Book of Genesis as a clear exception to this rule. An absence of a clear criterion would render his view an easy prey to inconsistency. The main criterion at that time was articulated by Bellarmine: in order for a scientific theory to demand a nonliteral interpretation of a passage in the Bible, it is necessary that the scientific theory concerned be demonstratively true, i.e., true beyond all reasonable doubt. One must show that the scientific theory cannot be false. It is true that this was the Catholic position and hence Kepler did not have to abide by this. However, as far as I know, the other Christian denominations with which Kepler had close contact took an even more stringent position. Hence I believe that Kepler accepted Bellarmine's criterion. This is clear from his statement right in the beginning of the first chapter of the Mysterium Cosmographicum: "I promise generally that I shall say nothing which would be an affront to Holy Scripture, and that if Copernicus is convicted of anything along with me, I shall dismiss him as worthless."23 Hence it was necessary for Kepler to be absolutely sure of the truth of Copernicanism before he could opt for a non-literal interpretation of the biblical passages which seemed to go against the new theory. He was convinced of the veracity of the new theory, and so advocated the new interpretation of the Bible. Thus this important contribution of Kepler towards scriptural interpretation was a result of his deep faith in the scientific view in general, and the Copernican view in particular.

Science and Religion Reconciled

The theme of the Book of Nature and his consequent belief that astronomers are priests of God led Kepler to believe that science and religion are collaborators rather than contenders. From this theme it followed that both ordinary priests and astronomers have a sublime vocation to perform a sacred function. Their works complement rather than compete with each other. Hence one can be a scientist and a believer, there is no real conflict between science and religion.

Galileo (1564-1642)

Galileo's Loyalty to Catholicism

The theme of the Book of Nature and the Book of Scripture was important in the case of Galileo too. However, unlike Kepler, many historians of science often depict his case as a paradigm instance for the incompatibility between the two books, and consequently between science and religion. According to these scholars, far from looking for an integration between the two books, Galileo was arguing for their compartmentalization. His often-quoted statement "The Bible teaches us how to go to heaven, not how the heavens go" is interpreted as advocating a sharp demarcation between astronomy and Scripture, between science and religion.

However, in recent times several scholars have pointed out that this stereotype view is more a creation of certain later historians with vested interests than of historical data. It is abundantly clear that at no time did Galileo consider himself as an opponent of the Church. Although he was almost merciless in putting down his opponents, some of whom were highly placed in the ecclesiastical circles, it was never his intention to oppose and humiliate the Catholic Church. It is well-known that Galileo had many prominent ecclesiastics among his close friends. There is good evidence to believe that he always wanted to be a faithful Catholic. For instance, although many accusations were brought against him during his trial in 1633, he was particularly sensitive to two of them: one expressing doubts about his fidelity to the Catholic faith and the other accusing him of having used deceitful methods to obtain the imprimatur for his book, i.e., one referring to his religious authenticity and the other to his moral character. He pleaded with the authorities to have both these accusations repealed, which was readily conceded. one. In his letter to his friend Cardinal Dini he expressly stated that his efforts to show the compatibility between Copernicanism and the Bible arose not out of any malice but in the "hope of at least showing my affection for the holy Church."24

Galileo on Scriptural Interpretation

When it came to the relationship between the Book of Nature

and the Book of Scripture, Galileo did not find any contradiction between the two. Like Kepler, he was convinced that the message of the Bible was true and commanded our total adherence. Again, like Kepler, he had no doubt about the veracity of the revelation of the Book of Nature as given by the Copernican system. The challenge before him was "to prove that the position of Copernicus is not contrary to Scripture."²⁵ This task at the time looked formidable since he had to confront objections from various sides: theological, philosophical, and scientific. He courageously set out to address all of these.

To begin with, Galileo admitted that at first appearance there were contradictions between the Copernican and the biblical views since several biblical passages seemed to go against a stationary sun and a mobile earth. But he pointed out that the contradiction arose because of the literal interpretation of the Bible. He argued that the Bible was not to be understood literally, particularly the passages dealing with astronomy because the purpose of the Bible was the attainment of "the salvation of souls and the service of God."²⁶ Since the biblical message is for all, particularly for the ordinary and unsophisticated people, its language and style would have to accommodate to their level. As in the case of Kepler, using the well-known accommodation theory, he explained away the apparent contradiction between certain biblical passages and the Copernican system.

But there were many objections to such a nonliteral interpretation of the Bible, the most vehement ones coming from Cardinal Bellarmine, undoubtedly the most authoritative and influential Catholic theologian of the day. According to the Cardinal, "Scripture is the immediately revealed word of God, and was written as dictated by God.... There can be no error in Scripture, whether it deals with faith or morals, or whether it states something particular and pertaining to only one person."²⁷ Concerning historical, lyrical, and any other non-religious items, such as astronomy, he said: "In Scripture there are many things which of themselves do not pertain to the faith, that is, which were not written because it is necessary [for salvation] to believe them. But it is necessary to believe them because they were written."²⁸ Bellarmine went further to assert that "it will not do to say that this is not a matter of faith, because though it may not be a matter of faith *ex parte objecti*, or as regards the subject treated, yet it is a matter of faith *ex parte dicentis*, or as regards him who announces it."²⁹ In other words, although the subject matter of astronomy does not pertain to faith, since it is written in the Bible which is the word of God, it becomes a matter of faith. This position easily leads to a literal understanding of Scripture. Obviously, many scholars consider Bellarmine's view too rigid and too stringent, and some have subjected it to bitter criticism.

Perhaps it was this rigid requirement of Bellarmine that prompted Galileo to struggle to show that even from a literal point of view the Copernican heliocentric view rather than the Aristotelian-Ptolemaic geocentric view was in agreement with Scripture. Thus he argued that, contrary to the common view, the passage from Joshua "most clearly shows the falsity and impossibility of the Aristotelian and Ptolemaic world system and is also very well accommodated to the Copernican system."³⁰ According to his strangely ingenious explanation, the sun has an annual motion from the west towards the east, and a daily motion from the east towards the west. The motion proper to the sun is the annual one, the other belongs to the first sphere. Since day and night are caused by the motion of the first sphere, in order to lengthen the day one needs to make the first sphere stop, not the sun.

Therefore it is absolutely impossible in the system of Ptolemy and Aristotle to stop the motion of the sun and thereby to lengthen the day Hence either one must say that the motions are not arranged as Ptolemy said, or one must alter the meaning of the words, and say that, when the Scripture says that God stopped the sun, he really wished to say that he stopped the first sphere.³¹

Since a literal reading of the text does not agree with the geocentric system, we should look for another arrangement of the system, viz., the Copernican heliocentric one. He says that his discovery of the sunspots has proven that the sun rotates on its own axis. Also it is highly probable that the sun is the cause of planetary motion.

Therefore, if in agreement with the position of Copernicus we attribute the daily rotation primarily to the earth, then who does

not see that, in order to stop the whole system without any alteration in the remaining mutual relation of the planets but only to prolong the space and time of the daylight, it is sufficient to make the sun stop, exactly as the literal meaning of the sacred text says?³²

In this way on the basis of the Copernican system "it is possible to lengthen the day on earth by stopping the sun, without introducing any confusion among the parts of the world and without altering the words of Scripture."³³Hence, according to Galileo's interpretation, the sun had only a rotational motion and Joshua's prayer was to stop only this motion. It is clear that Galileo was not very happy and content with this line of argument, as is evident from the fact that later on when he took up the topic of scriptural interpretation more deeply and elaborately in his much celebrated *Letter to the Grand Duchess* Christina he never went back to it.

Bellarmine agreed that the Bible often needed interpretation, but he insisted that "the Council of Trent forbids the interpretation of the Scriptures in a way contrary to the common opinion of the holy Fathers."³⁴

Galileo responded to these objections in his *Letter to the Grand Duchess Christina*. For instance, in response to the requirement of the agreement with the common opinion of the Fathers he himself quoted the very same Fourth Session of the Council of Trent: "So far as I can find, all that is really prohibited is the perverting into senses contrary to that of the holy Church or that of the concurrent agreement of the Fathers those passages, and those alone, which pertain to faith or ethics or which concern the edification of Christian doctrine."³⁵ He went on to point out that "the mobility or stability of the earth or sun is neither a matter of faith nor one contrary to ethics." According to him, "neither would anyone pervert passages of Scripture in opposition to the holy Church or to the Fathers, for those who have written on this matter have never employed scriptural passages.³⁶

It was known that the Church tradition permitted a nonliteral interpretation of Scripture when it was clear that the literal reading went against a demonstrated (i.e., sure and certain) truth. Hence if Copernicanism could be shown to be a demonstrated truth, a nonliteral interpretation would be justified. Bellarmine referred to this condition when he wrote to the Copernican Paolo Antonio Foscarini in 1615:

If there were a real proof that the sun is in the centre of the universe, that the earth is the third heaven, and that the sun does not go around the earth but the earth round the sun, then we should have to proceed with great circumspection in explaining passages of Scripture which appear to teach the contrary, and rather admit that we did not understand them than declare an option to be false which is proved to be true."³⁷

Galileo too was well aware of it, as was evident from his letter to Dini: "To me, the surest and swiftest way to prove that the position of Copernicus is not contrary to Scripture would be to give a host of proofs that it is true and that the contrary cannot be maintained at all; thus, since no two truths can contradict one another, this and the Bible must be perfectly harmonious."³⁸

In this department Galileo had a clear superiority over Kepler, for although the latter did give empirical data in support of Copernicanism, they lacked the excitement and persuasiveness of Galileo's telescopic discoveries. But, as many scholars have repeatedly pointed out, all the empirical evidence Galileo could muster fell far short of a demonstrative proof.³⁹ This never prevented him from asserting that the new theory was true. Later developments in science like Bradley's discovery of the aberration of light in 1725, Bessell's discovery of the stellar parallax in 1838, and the introduction of Foucault's pendulum in 1851, etc., provided what Galileo failed to produce in his day. Galileo was definitely right, but for reasons he could not deliver in his lifetime. It is true that Galileo never fully succeeded in integrating the two books on the basis of scientific data, as he had hoped and even claimed; but it is quite clear that this noble task had always been his great ambition.

Isaac Newton (1642-1727)

Newton on Scriptural Interpretation

Newton believed that God reveals through both the Book of Nature

and the Book of Scripture. But being one of the greatest scientists of all times, his emphasis lay very much on the God revealing in and through the latter. Like his predecessors Kepler and Galileo, Newton too took his religion seriously.

With regard to Scripture he followed the Kepler-Galileo tradition to remain open to a nonliteral understanding of certain passages, especially those pertaining to the creation of the universe. In his own words, "As to Moses, I do not think his description of creation was either philosophical or feigned, but that he described realities in a language artificially adapted to the sense of the vulgar."⁴⁰

From Cosmology to the Cosmic Mechanic

Reflection on the Book of Nature led Newton directly to God whom he considered the Lord and Master of the universe. According to him, it would be only natural for a scientific mind to make a smooth transition from the visible creation to its creator. He confided to his disciple Richard Bentley that one of his principal motivations for writing the *Principia* was to assist thinking persons in discovering the Deity: "When I wrote my treatise about our system, I had an eye upon such principles as might work with considering men for the belief of a Deity; and nothing can rejoice me more than to find it useful for that purpose."⁴¹ From his cosmology he could move to the cosmic mechanic.

Newton's strategy was to begin with a careful observation of natural phenomena. Scientific reflection on the observed data led one to secondary causes, which on further reflection led to the primary cause. Two basic assumptions guided him in this process:

1. The rationality of nature, in the sense that for every natural phenomenon there must be a rational explanation, 2. The rejection of any explanation in terms of mere chance, since for him an explanation in terms of chance was no explanation at all. For instance, he asks: "Did blind chance know that there was light and what its refraction was, and fit the eyes of all creatures after the most curious manner to make use of it?"⁴² His study of several important cosmic phenomena revealed that not even the most sophisticated science available at that time could

explain them adequately. Since there had to be a rational explanation for these phenomena, recourse to a non-scientific agency was inevitable. For instance, his quest for an explanation of the regularity and variety of motions of the bodies in the solar system led him to conclude that "blind metaphysical necessity which is certainly the same always and everywhere, could produce no variety of things."43 The science of mechanics too was helpless in this case: "It is not to be conceived that mere mechanical causes could give birth to so many regular motions, since the comets range over all parts of the heavens in very eccentric orbits."44 The presence of comets complicated the situation since unlike the planets they followed irregular orbits. All these considerations led him to this conclusion: "The most beautiful system of the sun, planets, and comets could only proceed from the counsel and dominion of an intelligent and powerful Being."45 For Newton the path of mechanics was never a deviation from the path to the cosmic mechanic. The reading of the Book of Nature brought him face to face with its author himself.

Albert Einstein (1879-1955)

The Cosmic Religion

Some people may be surprised to find Einstein being brought into a discussion on the theme of the Books of Nature and Scripture, since according to some scholars, he was an agnostic, if not an atheist. However, a close and open-minded look at his life and writings reveals that he was a deeply religious person, albeit a very unconventional one. It is well-known that many of his hard-headed scientist disciples and admirers used to feel embarrassed at his religiosity. But he firmly believed that "in this materialistic age of ours the serious scientific workers are the only profoundly religious people."⁴⁶ In his view, "the cosmic religious feeling is the strongest and noblest motive for scientific research."⁴⁷

Earlier reference was made to cosmic religions which emphasized God revealing through nature. Einstein's ideas shared much in common with this tradition, his scientific reflections on natural phenomena leading him to a form of Deity. We have also seen that those who emphasized revelation through nature had a tendency to play down the written tradition. Einstein's brand of cosmic religion "knows no dogma and no God conceived in man's image; so that there can be no church whose central teaching is based on it."⁴⁸ Obviously, in such a religion there is hardly any place for any holy book.

According to Einstein, true religion is the religion of cosmic consciousness, which essentially aims at breaking down the narrow confines of one's individuality to become open to the whole cosmos. "The individual feels the futility of human desires and aims and the sublimity and marvelous order which reveal themselves both in nature and in the world of thought."⁴⁹ It aims at the "free and responsible development of the individual, so that he may place his powers freely and gladly in the service of all mankind."⁵⁰ In this religion believers will have to "avail themselves of those forces which are capable of cultivating the Good, the True, and the Beautiful in humanity itself."⁵¹

From the Book of Nature to Super-Reason

The God of Einstein was not the personal God of Abraham, Isaac and Jacob, but a God of Super-Intelligence or Super-Reason, revealed in and through nature. According to him, when we reflect on the cosmic order around us, we are filled with a rapturous amazement, which on further deep and dispassionate reflection reveals the Super-Intelligence or Super-Rationality. "Compared with it, all the systematic thinking and acting is an utterly insignificant reflection It is beyond question closely akin to that which has possessed the religious geniuses of all ages."⁵² This Reason Incarnate "in its profoundest depths, is inaccessible to man."⁵³ There is no doubt that this Super-Reason which shares many characteristics of the impersonal God of certain religions is revealed through the Book of Nature.

Paul Davies (1946-)

God As an Emergent Being

Several ideas Paul Davies develops in his many writings have a direct bearing on the theme of the Book of Nature. He is of the opinion that "science offers a surer path to God than religion."⁵⁴ This claim, obviously, will not go unchallenged, but it at least calls our attention to

the great impact modern science has on matters of God and religion. As he himself remarks, "The fact that science has actually advanced to the point where what were formerly religious questions can be seriously tackled, itself indicates the far-reaching consequences of the new physics."⁵⁵ Scientific investigation of certain natural phenomena can lead us to believe in the existence of God. In fact, our knowledge of the existence and nature of God is inextricably linked to the universe.

Articulating the linkage between God and the universe, Davies argues that God is a holistic concept; in fact, the supreme holistic concept. In a holistic phenomenon a new force or organizing influence that does not have its origin in the components initially emerges at the collective level. The holistic process involves emergent properties or beings. For instance, from this perspective the mind is an abstract, holistic, organizational pattern capable of even disembodiment.

The God of Davies is an emergent being that emerges when the whole universe is put together. Obviously, such a view is a far cry from the traditional understanding of God, and raises a host of problems. For instance, what is the nature of this emergent being? Can it have an existence independent of the universe? If it is dependent on the universe, how to account for the existence of the universe? If it is independent of the universe, why does it show an inevitable dependence on the parts of the universe?

Science a Surer Path to God

How can science, the study of the Book of Nature, be a surer path to God than religion? Although Davies disclaims the role of the traditional argument from design to provide a strong proof for God's existence, he singles out certain special natural phenomena as being capable of making a strong case in favour of a Super-Intelligent Being. Scientists have come across certain hitherto unexplained "cosmic coincidences" revealing a "fine-tuned" universe. There exist a number of fundamental quantities the specific values of which have to be exactly what they are at present to produce and maintain our universe as it is today. A slight deviation from the current values would throw the whole universe out of balance and lead to catastrophic consequences. The charge and mass of electrons and protons, the velocity of light, etc., are a few examples. Why do they have exactly these values? Who or what is responsible for maintaining them at their current level? Davies's inquiring mind remains unconvinced by the usual explanation of these "coincidences" in terms of chance, and believes that these cases present the most surprising evidence for a grand design. This is yet another instance of the Book of Nature attempting to reveal its author.

Conclusion

The theme of the Books of Nature and Scripture, despite its antiquity, still retains much relevance in our science-dominated world. Many scientists like Einstein may not heed the revelatory value of the holy books, but they do recognize the existence of some supreme being revealing itself in and through the universe. Over the centuries many almost ruthless attempts have been made to shut off or at least blur the glow of the creator beaming through creation. David Hume, for instance, spared no pains to prove that God was a myth and the Scriptures a bunch of fables. Friedrich Nietzsche at the turn of this century declared the "death of God." Bertrand Russell in more recent times resurrected the ideas of Hume. Most recently, Stephen Hawking has attempted to do away with the need for a creator. But it is now clear that all such paths to have "a creation without a creator" lead to self-contradiction. Our study of the theme of the Books of Nature and Scripture seems to render the words of astronomer Jastrow prophetic:

For the scientist who has lived by his faith in the power of reason, the story ends like a bad dream. He has scaled the mountains of ignorance; he is about to conquer the highest peak; as he pulls himself over the final rock, he is greeted by a band of theologians who have been sitting there for centuries.⁵⁶

Notes

¹ Dr. Job Kozhamthadam, till recently, was a member of the Indian National Commission for the History of Science, Indian National Science Academy. He is the Founder-President of the Association of Science, Society, and Religion, Pune.

- ² David Lindberg, "Science and the Early Church," in *God and Nature*, ed. David Lindberg and Ronald Numbers (Berkeley: University of California Press, 1986), p. 30.
- ³ Lindberg, "Science and the Early Church," pp. 30-31.
- ⁴ St. Augustine, *Enchiridion*, tr. Albert Butler, *The Library of Christian Classics*, vol. 7 (Philadelphia: Westminster Press, 1955), pp. 341-342, quoted by Lindberg, "Science and the Early Church," p. 31.
- ⁵ Johannes Kepler, *Gesammelte werke*, ed. Von Dyck, Max Caspar, F. Hammer, and V. Bialas (Munich, 1937-), vol. XIII, nr. 117: 11. 295-296. Hereafter this series will be referred to as GW.
- ⁶ Carola Baumgardt, ed. and tr. *Johannes Kepler: Life and Letters* (New York: Philosophical Library, 1951), p. 32.
- ⁷ Here one can see clearly the influence of Pythagoreanism and Neoplatonism. The former believed that engaging in the study of nature was a sure way to attain salvation, while the latter looked upon the universe as the manifestation of the Supreme Being.
- ⁸ See letter to Fabricius, dated July 4, 1603, in GW XIV, nr. 262: 11. 495-496.
- ⁹ GW IV, p. 246: 11. 23-24.
- ¹⁰ Kepler's letter to Maestlin, dated October 3, 1595, in GW XIII, nr. 23: 11. 72-74.
- ¹¹ Ibid., nr. 23: 11. 78-84.
- ¹² Kepler, *Mysterium Cosmographicum*, tr. A.M. Duncan (New York: Abaris Book, 1981), p. 71.
- ¹³ GW VII, p. 25: 11. 29-31.
- ¹⁴ Kepler's letter to Maestlin, written on October 3, 1595, in GW XIII, nr. 23: 1.254.
- ¹⁵ GW III, p. 108: 1. 3.
- ¹⁶ Kepler's letter to Herwart, written on March 25, 1598, in GW XIII, nr. 91: 11. 182-184. See Nicholas Jardin, *The Birth of History and Philosophy of Science: Kepler's "A Defense of Tycho against Ursus"* (Cambridge: Cambridge University Press, 1984), p. 9.
- ¹⁷ GW VII, p. 9: 1. 12.

- ¹⁸ Kepler, *Mysterium Cosmographicum*, p. 85.
- ¹⁹ Letter on March 28, 1605, in GW XV, nr. 340; 11. 85-86.
- ²⁰ GM VII, p. 99; 11. 27-29, tr. Rosen.
- ²¹ GW III, p. 30: 11. 13-16, tr. 0. Gingerich and W. Donahue.
- ²² GW III, p. 30: 11. 1-4.
- ²³ Mysterium Cosmographicum, p. 75.
- ²⁴ Galileo, "Letter to the Grand Duchess Christina," in *Discoveries and Opinions of Galileo*, tr. Sti1Iman Drake (New York: Doubleday Anchor Books, 1957), p. 166.
- ²⁵ Drake, p. 166.
- ²⁶ Olaf Pedersen, *The Book of Nature* (Vatican City: Vatican Observatory Publications, 1992), p. 50.
- ²⁷ Quoted in Richard Blackwell, *Galileo, Bellarmine, and the Bible* (Notre Dame: University of Notre Dame Press, 1991), p. 31.
- ²⁸ Blackwel1, p. 31.
- ²⁹ James Brodrick, S.J., *Galileo: The Man, His Work, His Misfortunes* (London: Geoffrey Chapman, 1964), p. 94.
- ³⁰ Galileo, "Galileo's Letter to Castelli," Blackwell, p. 199.
- ³¹ Blackwel1, p. 200.
- ³² Blackwel1, p. 201.
- ³³ Blackwell, p. 201.
- ³⁴ Brodrick, *Galileo*, p. 94.
- ³⁵ Drake, p. 203.
- ³⁶ Drake, p. 203.
- ³⁷ James Brodrick, S.J., *The Life and Work of Blessed Robert Francis Cardinal Bellarmine, S.J.*, (New York: P.J. Kennedy and Sons, 1928), p. 359.
- ³⁸ Drake, p. 166.

- ³⁹ See for instance, Job Kozhamthadam, S.J., "The Galileo Episode Revisited," *Vidyajyoti* 58 (1994), pp. 337-358.
- ⁴⁰ H. S. Thayer, ed., *Newton's Philosophy of Nature* (New York: Hafner Press, 1954), p. 60.
- ⁴¹ Thayer, p. 46.
- ⁴² Thayer, p. 66.
- ⁴³ Thayer, p. 44.
- ⁴⁴ Thayer, p. 42.
- ⁴⁵ Thayer, p. 42.
- ⁴⁶ Albert Einstein, *Ideas and Opinions* (New York: Bonanza Books, 1954), p. 40.
- ⁴⁷ *Ideas and Opinions*, p. 39.
- ⁴⁸ *Ideas and Opinions*, p. 38.
- ⁴⁹ *Ideas and Opinions*, p. 38.
- ⁵⁰ Ideas and Opinions, p. 43.
- ⁵¹ *Ideas and Opinions*, p. 48.
- ⁵² *Ideas and Opinions*, p. 40.
- ⁵³ Ideas and Opinions, p. 49.
- ⁵⁴ Paul Davies, God and the New Physics (New York: Simon and Schuster, 1983), p. ix.
- ⁵⁵ Davies, p. ix.
- ⁵⁶ R. Jastrow, *God and the Astronomers* (New York: Warner Books, 1980), p. 125.