

MODERN SCIENCE AND THE CHRISTIAN FAITH – F.G.Oosterhoff

At this conference we will be dealing with the question how we are to teach science in such a way that our students learn to integrate their scientific learning with their Christian faith. This topic can be approached from various angles. For this paper I have chosen the following three: (1) acknowledgement of the subjective element in knowing, (2) the Argument from Design with reference to natural theology, and (3) the Argument from Design with reference to twentieth-century discoveries.

1 The subjective element in knowing

This is the topic that I have focused on in my paper “Integrating Faith and Learning,” delivered last September at the Sumas Conference, which you have been asked to read in advance. It was suggested that I return to it at this meeting, even if only briefly. I will do so, and begin with a bit of historical background.

The growing realization of the subjective element in knowing coincided with the rise of *postmodernism*. Under *modernism* the immense success of modern science had led to the belief that the scientific method led to absolutely objective truth; that science was capable of solving every mystery, and that in the end it would make possible the establishment of a heavenly city on earth. The disasters of the twentieth century, however, destroyed this faith. They opened people’s minds to the fact that science and technology are not omnipotent after all, and that the modern trust in the ideal of objectivism had been an illusion. In this same period studies in the history and philosophy of science substantiated that conclusion. They did so by showing the role of *extra-scientific* factors in the formation of scientific theories. Chief among these factors are the prevailing worldview and the presuppositions of the individual scientist. Their influence is of course obvious, and it is amazing that it was so long ignored. For nature answers only the questions a scientist asks her, and the type of questions that are asked depends on the scientist himself and on his society. This can only mean that scientific theories are not the automatic and inevitable result of following a certain foolproof method. They are affected by all sorts of subjective elements.

In brief, it is now realized that although dealing with an *objective* reality, science does so in a *subjective* and therefore a *fallible* manner. As Einstein once said: “The sense experiences are the given subject matter. But the theory that shall interpret them is man-made . . . never completely final, always subject to question and doubt.” To prevent misunderstanding, I want to emphasize right here that the intrusion of the subjective element does not mean that scientific knowledge is stagnant. Far from it. Common sense alone already shows that there is progress – witness, for example, the very great advances that are made in science-based technology. In fact, it appears that rather than *preventing* scientific progress, subjective factors such as the scientist’s beliefs and the prevailing worldview *facilitate* and *expedite* it. Historians of science have shown this in a variety of instances. Among them are the rise and acceptance of the Copernican hypothesis, Darwinism, and quantum physics. Extra-scientific factors related to the worldview of the period, they showed, played a role both in the rise of scientific theories and in their acceptance. It is this human element, incidentally, that makes the history of science so interesting.

Teachers should try to make the connection between scientific theories and worldview clear - for example when they explain the rise and triumph of Darwinism.

The acknowledgement of the subjective factor has been welcomed especially among Christians, and understandably so. After all, it was the widespread belief in the total objectivity of scientific pronouncements that caused such great problems for them. It led to the suggestion, for example, that if science pronounced the Bible to be in error, then it was in error. More than one Christian student has lost his or her faith because of this. Let us rejoice that this stumbling block has been removed.

Teachers must be aware of the subjective element in knowing. Should they teach it their students as well? That depends. I myself have taught it for years, but only at the senior secondary and the postsecondary levels. For younger students it is probably too difficult and confusing, and even with older ones we must take care that they do not consider it a gateway to subjective relativism. In my previous paper I have given arguments why such a relativistic conclusion is absurd. Nevertheless, in this relativistic age it is necessary to be on guard. Our students must learn, as the well-known Anglican theologian N. T. Wright once expressed it, that while our human *knowledge* is never independent of the knower, it deals with *realities* that *are* independent of the knower.

And again, that makes sense. Reality – that is, nature, creation, the world we study – is the work of an omnipotent, all-wise Creator and is not in the least affected by our thoughts or wishes. Our *knowledge*, however, is human, finite, and fallible, coloured by the worldview “glasses” we wear. The hubris of modernism was to believe that the human being is able to see reality as God sees it. Reacting to this arrogance and its consequences, postmodern relativists fell off the other side of the horse and concluded that since we can’t know as God knows, we can’t know at all; that knowledge and truth are just social constructs. Both conclusions must be rejected. It has been my experience over the years that once students understand the difference between the *subjectivity* of human knowing and the *objectivity* of the reality we study, they experience the defeat of the objective ideal as altogether liberating.

So much, then, for the first argument. I will come back to it in my workshop, and it can of course also be a topic of discussion in the next period. I move on to the second topic,

2 The Argument from Design – with reference to natural theology

The Argument from Design is as old as the Bible. Already in the Old Testament, in the Psalms, the Prophets and elsewhere, we read in a multitude of contexts that the heavens declare the glory of God and the skies proclaim the work of his hands. As Arnold Sikkema reminds us in one of his papers, the Old Testament often speaks of a *covenant* that God has made with the heavens and the earth; a covenant on which we may rely, also in our scientific work. The best-known text in the New Testament telling us that creation gives witness to God is found in Romans 1, where Paul writes that what may be known about God is plain to man, because “since the creation of the world God’s invisible qualities – his eternal power and divine nature – have been clearly seen, being understood from what has been made, so that men are without excuse” (1: 19, 20).

2.1 *The “Book of Nature”*

Taught by the Bible, Christians have from early times therefore spoken of two sources, or two “books” of revelation. Augustine already used the two-books metaphor. That same metaphor became familiar to us because of its use in Art. 2 of the Belgic Confession. There we read that we know God by two means: “First, by the creation, preservation, and government of the universe; which is before our eyes as a most beautiful book, wherein all creatures, great and small, are as so many letters leading us to *perceive clearly the invisible qualities of God, namely, His eternal power and deity. . . .* Second, He makes Himself more clearly and fully known to us by His holy and divine Word. . . .”

As Dutch philosopher Dr. Gijsbert van den Brink has pointed out in a recent paper, the metaphor of the two books provided an important stimulus for the rise of modern science in the sixteenth and seventeenth centuries. People reasoned that if nature is indeed a book written by God for our instruction, then we have the duty to investigate it. In that sense Guido de Bres, the author of the Belgic Confession, may indeed have greatly influenced the rise of modern science, at least in protestant countries, as Van den Brink suggests. It was not, however, a metaphor that spoke to protestants only; Roman Catholic scientists also made use of it.

The Reformation, Van den Brink observes, had yet another influence on the scientific revolution. He writes: “Just as the Reformation set aside the allegorical method to explain the second book, Holy Scripture, because it wanted to stay close to the literal meaning - so this same Reformation stimulated people to stay close to nature in their investigations, and therefore to follow the experimental method, rather than approach nature on the basis of preconceived notions.” This speculative approach was of course common to Aristotelian science, which continued to dominate much of the Middle Ages. A well-known example was the assumption that the orbits of the heavenly bodies must be exactly circular, because circularity symbolized perfection and, unlike the earth, the heavens were perfect. It was when Johannes Kepler in the early 1600s began to observe and measure and calculate – that is, when he began using the experimental method – that the elliptic form of planetary orbits became known. And this is only one example of many. Think also of the use of the telescope by Galileo, Kepler’s contemporary.

2.2 *Natural theology: questions and pitfalls*

The confession of God’s revelation in nature proved fruitful in subsequent centuries. It stimulated not only scientists, but it also played a dominant role in apologetics, the reasoned defence of the faith. Because the evidence of design in creation was a central element in that defence, this type of apologetics is often referred to as “natural theology.”

Eventually, however, questions were raised about its use. I am describing two of them, because they continue to be relevant for us today. Firstly, in course of time the first book (i.e., nature) began to be seen as the most important source of divine revelation. The second book, Scripture, was more and more ignored; it became increasingly common to base knowledge of God on the book of nature alone. In view of this danger, some Christians rejected natural theology, declaring that we can know God only by His special revelation, the Bible. Well-known among these opponents of natural theology are the

nineteenth-century philosopher Soren Kierkegaard and the twentieth-century theologian Karl Barth. They are called fideists, because they rely on faith (*fides*) alone, rather than on faith and reason.

Although Reformed Christians have not gone as far as Kierkegaard and Barth, they are aware of the danger to which these men pointed. They are careful, for example, to avoid the mistakes of some earlier Christians, such as the medieval philosopher Thomas Aquinas, who spoke of nature and reason as giving *proofs* of God's existence and even of some of His attributes. Reformed apologists stay closer to John Calvin, who insisted that arguments from nature and reason can be "useful aids" in showing the credibility of Scripture. But rather than calling them *proofs*, he spoke of the *testimony* creation gives to the work of God. He also made clear that neither nature nor reason can ever reveal to us God as He has made Himself known in Jesus Christ. Nor can these arguments lead to saving faith. That is the work of the Holy Spirit alone.

Let me relate a brief anecdote in connection with the error to which Kierkegaard and Barth and their followers drew attention. Last week, when I told Christine van Halen that my paper would speak about Art. 2, she wrote back that her father, Dr. Jelle Faber, always used the word *revelation* only for God's revelation in His Word, and spoke of *manifestation* (from *manus*, Latin for hand) to indicate how He has been and continues to be active in creation. It's another reminder that, important as the book of nature is (and I want to keep underlining this), we rightly confess in the same Art. 2 that "God makes Himself more clearly and fully known to us by His holy and divine Word. . . ."

The second problem that arose in connection with natural theology is often described as the *God-of-the-gaps* error. It too came to the fore with the scientific revolution. The model of the world that this revolution adopted was a mechanistic one. The earth and the entire universe were to be seen as one gigantic machine that ran in accordance with unchanging, eternal natural laws. It was a clockwork, and more and more God was seen as the Great Clockmaker or the Great Engineer. Once He had made the clock or machine and set it going, it ran by itself; no further overseeing was necessary. For many, God was becoming the God of deism, who had nothing to do with the world any more. And soon the question arose whether He had been necessary in the first place. Perhaps, scientists and philosophers reasoned, the universe had had no beginning; perhaps it had existed from eternity. Deism easily led to atheism.

Orthodox Christian scientists became concerned about these implications of the machine model and tried to find ways and means to bring God and divine providence back into the picture. A well-known example, which I have mentioned before, is that of the great Isaac Newton himself. Newton noted irregularities in the planetary orbits and used this as a guarantee of God's continued presence in nature: God, he said, had to intervene repeatedly to stabilize things. The German philosopher Leibniz, Newton's contemporary and rival, disagreed, accusing Newton of diminishing God's majesty by assuming that His work was so haphazard that it needed constant repair. Soon the Frenchman Laplace was able to provide a scientific refutation of Newton's theory by showing that the irregularities were self-correcting so that, as he told Napoleon, he had no need of the "God hypothesis." There was a natural, mechanistic explanation.

Newton's error, which has been repeated by others, should serve us as a warning. When we use God as a means of filling gaps in our knowledge, the result is a dishonouring of Him whenever a scientific explanation for the phenomenon in question is found after all. Fear of the God-of-the-gaps error is one of the reasons why, as I have mentioned elsewhere, I have my questions about the Intelligent Design movement, much as I admire ID scientists for their questioning of Darwinist ideologies.

3. *The Argument from Design – with reference to twentieth-century discoveries*

The foregoing has concentrated quite heavily on how we are not to use the book of nature in defending the faith. It has warned us that (1) in seeking to know God we may never forget about his revelation in the second book, namely the written Word, and (2) we must think twice before using the so-called "God hypothesis" to fill the gaps in our knowledge. Let us simply follow those early scientists who rejoiced in discovering the testimony in nature of what Romans 1 calls "God's invisible qualities – his eternal power and divine nature." By doing so we come closest, I believe, to the original meaning of the ancient Argument from Design.

That Argument has been greatly enhanced by recent discoveries in physics, astronomy and cosmology, and it is these discoveries that I want to bring to your attention in this section. I am referring to two separate fields: (1) the fine-tuning of the universe, and (2) the rare-earth hypothesis. I expect that most of you are aware of these discoveries. You may even have read the articles I published on the topic a few months ago in *Clarion*, where I showed the effect they have had on the search for intelligent aliens, usually called the Search for Extra-Terrestrial Intelligence (SETI). If you have read the articles, what follows may serve to refresh your memory.

My starting point was the so-called *Copernican Principle of Mediocrity*, a concept dating from the twentieth century. According to this principle the earth and its human inhabitants are typical, run-of-the-mill phenomena, the results of random evolutionary processes. Contrary to the message of the Bible, they are of no intrinsic significance and are certainly not unique. This principle, I pointed out, is based on the facts that (1) the cosmos, as became evident especially since the work of American astronomer Edwin Hubble in the early twentieth century, is much and much larger than was formerly assumed, (2) our earth, its solar system, and even its galaxy are little more than specks in this inconceivably vast universe, and (3) the human species is a late-comer in cosmic history, which spans billions of years. The limited *size* of our habitat and the limited *age* of our species, in short, are being used as arguments against our planet's and our own uniqueness. And the reason why the Copernican Principle has so greatly stimulated the Search for Extra-Terrestrial Intelligence is the assumption that, since the laws of nature are generally the same, developments that have taken place on the earth must have taken place elsewhere in the universe. The basic requirement for the development of intelligent life elsewhere was the existence of earth-like planets orbiting sun-like stars. Of such planets, it was believed, there should be untold numbers in the Milky Way alone.

That was the assumption. But as I proceeded to show, so far the search has failed, and the belief in the Copernican Principle of Mediocrity is not as strong today as it has been. Although it is still widely

accepted as scientifically proven, it is in fact under increasingly serious scientific attack. The scientists involved show that rather than being average, undistinguished, run-of-the-mill, the earth appears to be unique after all, and even uniquely fitted for life, and that the same applies to the solar system, the Milky Way galaxy, and the universe as a whole. With respect to the uniqueness of earth and solar system, the conclusion follows that we may be alone in the universe after all. Here follows a summary of what I wrote:

3.1 A Goldilocks universe

The discoveries against the Copernican Principle of Mediocrity and the assumptions on which it was based began during the second half of the twentieth century. One factor was growing evidence of the so-called “fine-tuning” of the universe. That term refers to the fact that the laws of nature are designed in such a way that they make possible (1) the very existence of the universe as such, and (2) the ability of this universe to sustain complex, intelligent life like our own. In connection with that second point, people are talking of a Goldilocks universe. The name is of course derived from the children’s story of Goldilocks and the three bears, where in the end things turned out to be “just right.”

Similarly, it was found, conditions in the heavens and on the earth are “just right” for complex life. Should the natural laws or physical constants be altered even to the smallest degree, a life-sustaining universe would be impossible. As physicist Karl Giberson writes: “Make gravity one percent stronger or weaker and the sun won’t shine properly; change the electrical force just a bit and organic molecules won’t form; make the universe expand just a little faster and there won’t be any solar systems. And so on. All of the various features of this universe appear to have been optimized for life.” He adds, “All this would occasion no surprise if it turned out that the laws of nature somehow have to have their current form, if there were some reason why gravity has its particular strength, electrons their mass, the photon its energy, and so on. But, as nearly as anyone can tell. . . there is no reason why the various features of our universe are the way they are, and not some other, equally plausible, way.”

All of this, of course, suggests design, rather than a process of random developments. Here as elsewhere in nature, the Creator appears to have given us a book written with marvellous letters and in a language that is altogether understandable for those who have eyes to see and ears to hear.

3.2 A privileged planet

The book of nature shows design not only in the universe at large, but also in the small part where we reside, namely the earth and its solar system. Here again, the idea of randomness and mediocrity are contradicted by solid scientific facts. I quote the following:

(1) There is the nearness of the moon, as well as its exceptional size and gravity. Our moon is large and heavy enough to stabilize the earth’s rotation and prevent its axis from tilting too far into the direction of the sun or giant planet Jupiter. The earth’s axis is tilted at 23.5 degrees, which gives us our seasons and thereby assures a relatively limited range in temperatures. The moon also helps raise ocean tides and currents, which again play a role in regulating climate. In these and in various other respects the

moon's life-supporting function is exceptional compared to other planet-moon systems that have been observed.

(2) The earth's situation appears optimal for the existence of life also because the planet enjoys protection from asteroids, comets, and other "near earth objects" from space. There are large numbers of such objects threatening us, and depending on their size their impact could be devastating. Other planets, however, including Jupiter, Saturn, and Mars, as well as our moon, form a protective shield around the earth, safeguarding our planet from ongoing bombardments. They serve as "cosmic vacuum sweepers," drawing killer rockets to themselves and so diverting them from planet earth. In the absence of these vacuum sweepers, it is unlikely that we would be here.

(3) The earth is located at the proper distance from the sun. If it were further away, its temperature would be closer to that of Mars with its perpetual deepfreeze; if it were closer, it might suffer the scorching heat of Venus. In either case, complex life would be impossible.

(4) Other necessities of life which the earth provides (unlike other planets in our system) include liquid water, an oxygen-rich atmosphere, and a protective magnetic field.

(5) Also important is the location and mass of the sun. Our sun is at the right distance from the overcrowded centre of the galaxy, where cosmic radiation is too high for life to exist. The sun has also the proper mass, making it possible for our planet to orbit at a safe distance – neither too close to its star nor too far away from it. Although more massive than many other stars, the sun is not so massive that it would produce excessive amounts of radiation and thereby make life impossible. It is also a very steady source of energy. If energy output was not constant – if there were great increases or decreases – the consequences could again be deadly for complex life.

In short, little about the earth and its solar system is typical, ordinary, undistinguished. Both appear to be exceptional, and so far, in spite of years of very energetic and very expensive research, no similar system has been discovered. For the time being it seems best, therefore, to assume the correctness of the rare-earth hypothesis. The "coincidences" are too striking. They go directly against the Copernican Principle of Mediocrity and the related belief in unplanned, unguided, random evolution.

3.3 The Anthropic Principle

Astronomers refer to the various factors I described as the "Anthropic Principle" (from *anthropos*, Greek for "human being"), since they suggest the "human-friendliness" of the earth, the solar system, the galaxy, and the cosmos itself. The news has, for obvious reasons, been welcomed by Christians. Unbelieving scientists also realize its strength and quite a few have attempted to disprove it. For them the universe simply *has* to be the result of a random process, and they try to safeguard this cherished belief at all costs. The best known argument against design is the assumption of a multiverse – that is, of an infinite number of unobservable parallel universes, which because of their great multitude just might by accident yield one universe with the necessary properties for life, namely ours. The argument is similar to the one that a million monkeys who are provided with a million computers will in the end, again by pure accident, produce the play *Hamlet*. I read somewhere, incidentally, that that argument, has been tested and found wanting. (Apparently the monkeys produced nothing but lists of aaaa's and zzzz's and so on, or used the computers as toilets.) The argument of the multiverse seems to me to be

just as speculative as that of the million monkeys. It certainly needs as much faith as does the belief in a Creator.

But there are also scientists who agree that the anthropic evidence is too strong to be ignored. Among them is the British astronomer Sir Fred Hoyle, who made the well-known statement, "A common sense interpretation of the facts suggests that a super intellect has monkeyed with physics, as well as with chemistry and biology, and that there are no blind forces worth speaking about in nature." In his *A Brief History of Time* Stephen Hawkins writes, "It would be very difficult to explain why the universe should have begun in just this way, except as the act of a God who intended to create beings like us." Yet another scientist, physicist Paul Davies admits, "I have come to believe more and more strongly that the physical universe is put together with an ingenuity so astonishing that I cannot accept it merely as a brute fact."

3.4 Tell and show

I have given this lengthy summary because in the fine-tuning of the universe and the uniqueness of planet earth we have evidence of design that *should* be taught at our Christian schools, and that *can* be taught even at some of the more junior levels. It is about real science, as even atheists will admit, and it has great apologetic value. It is of course true that we must not overestimate the religious significance of the discoveries. Scientific theories change, and anyone who puts his faith in them walks on quicksand. That goes for Christians and atheists. But the findings do give witness to the wisdom and immeasurable power of the Creator and provide potent disclaimers of the current belief in a materialistic origin of reality.

The same applies, of course, to recent advances in astronomy and cosmology in general. Twentieth-century discoveries have shown the unimaginable vastness of the universe and we have seen that the Copernican Principle of Mediocrity arose in response to these findings. Christian teachers should make sure that they do not ignore these developments. I suggest that when teaching about the discoveries I described, and about astronomy and cosmology in general, they make sure to use visual aids. I have earlier recommended the DVD "The Privileged Planet," based on the book with the same title by Guillermo Gonzales and Jay W. Richards. I continue to recommend it, although no doubt there are other videos that fit the purpose. But do use them. When students have had *visible* evidence of "God's *invisible* qualities" in the created universe, then the first article of our confession – *I believe in God the Father almighty, Creator of heaven and earth*, will resonate much more deeply with them. So will the first petition of the Lord's Prayer, "Hallowed be Thy Name," which Lord's Day 47 of the Catechism explains in these words: *Grant us first of all that we may rightly know Thee, and sanctify, glorify, and praise Thee in all Thy works, in which shine forth Thy almighty power, wisdom, goodness, righteousness, mercy, and truth.*

Conclusion

We meet God in the Bible. We are convinced of the truth of the Bible by the power of the Spirit. And our conviction is further strengthened, we learned, by studying the book of nature. It is strengthened,

however, also by other means. That is what I want to mention by way of conclusion. I am turning again to the Belgic Confession, this time to Art. 5, where we confess that we receive the books of the Bible as Canonical “. . .*also because they contain the evidence thereof in themselves; for, even the blind are able to perceive that the things foretold in them are being fulfilled.*”

This is something that students should be reminded of. We can trace the fulfilment of Scripture of which Art. 5 speaks in the history of peoples and nations. No less importantly, we can trace it in our own lives, when we observe God’s power and providence in our day-to-day existence, and when by the power and grace of the Spirit we increasingly experience how the Lord is making Himself known to us *personally*, speaking to us as Person to person. C.S. Lewis once expressed this well when he wrote that instead of saying, in a more or less neutral fashion, *I believe that God exists*, we will learn to confess, *I believe in God, in this God, the increasingly knowable Lord*. When all is said and done, then, it is a matter not only of talking *about* God, but also and especially of walking *with* Him and coming to know Him at a deeper, personal level. Then we will know the truth, not just in our heads, but also in our hearts.

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