

Fine Tuning Mission to reach those influenced by Darwinism

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The scientifically aware section of the South African population is increasing. Many are being exposed to the concept of Darwinian evolution. Exposure has generated a religious sub 'people group' who have problems with Christianity because they have been influenced by the naturalistic element in Darwinian philosophy. Christian antagonism towards evolution has often prejudiced them unfavourably towards the gospel. Recent discoveries concerning the fine-tuning of the universe have now presented a window of opportunity for overcoming this. It may enable the church to 'fine-tune' its missionary approach to present them with the gospel in a more acceptable manner. It is suggested that Paul's Areopagus speech provides a model for such cross-cultural evangelism. A section is included at the end, describing some objections that have been raised against the cosmological fine-tuning apologetic.

Introduction

This article aims at demonstrating how a multi-disciplinary approach to Practical Theology may aid the church to fulfil the *missio Dei*. The church is created and sent into the world by the Trinity, and thus its identity is missional by its very nature (Bosch 1991:392; Ott, Straus & Tennant 2010:197). The missiological question in this case is, how can the church co-operate with God in sharing the gospel with those who have an epistemological view based on Darwinian naturalism, which profoundly differs from that found in the Christian paradigm?

This is an important question because a significant section of the educated section of the South African public believes in Darwinian naturalism which is prejudicing them against even considering the gospel. There is every indication that the proportion of the population that hold these beliefs will increase in all cultural groups as the quality and extent of scientific education expands since Darwinian evolution is now taught at secondary school level in South Africa (Tucker 2012:219). Bosch's (1991) *Transforming mission* has recently been criticised for not being African enough and not dealing with post-modern and/or African issues (Botha 2011). Yet this is due, in part, to the Christian national educational policy of the National Party which suppressed the teaching of much modern knowledge and ideas. This means that South Africa is still playing 'catch-up' in dealing with many modern issues, such as Darwinian naturalism (Lever 2002:40ff.).

Darwinian naturalism

The author defines Darwinian naturalism as the belief that everything in the universe can be explained by scientific and naturalistic principles. This belief stems from the perception that science has the ability to explain all of reality. Furthermore, because Darwin's theory of evolution by natural selection has been scientifically proven, our existence is deemed as having been explained satisfactorily as far as it can be. Thus Darwinian naturalism may be defined as the belief that '... the world of nature should form a single sphere without incursions from outside by souls or spirits, divine or human' (Lacey 1995:604). This means that the reality we experience is all there is, which is a metaphysical assumption (Nürnberger 2010:15) and may be classed as a 'religious idea' (Ruse 2003:1527).

The case for Darwinian naturalism being a religious idea is strengthened because it appears to have originated out of a metaphysical assumption. The British historian Matthew (1984:467) claims in *The Oxford illustrated history of Britain* that Darwin's *On the origin of species*, first published in 1859, '... was not a bolt from the blue, it fitted naturally into ... a corpus of writing on evolution'. In fact, the theory of Darwinian evolution was not a spontaneously generated idea that was gained from looking at the empirical evidence in the natural world but rather a long-held idea looking for empirical evidence and support in the natural world!

Long ago, Lewis (1967:82, 83) distinguished between scientific evolution and what he called 'evolutionism', which he saw as a theological creed. As Ferngren and Numbers (1996) point out, his letters reveal that he believed that evolution:

... is accepted by zoologists not because it has been observed to occur or ... can be proved by logically coherent evidence to be true, but because the only alternative, special creation, is clearly incredible. (pp. 28–33)

Thus from a missiological perspective, Darwinian naturalists may be considered an unreached people group.

The problem – unhelpful missional attitudes in the church

The missional process of the church sharing the gospel with Darwinian naturalists is sometimes hindered by the inability of the church to break out of its own traditional paradigms and interpretations of Scripture in order to effectively engage the world and make disciples. This would appear to be the case with many congregations in South Africa. Three main attitudes appear to characterise the attitude of the majority of members in most Christian churches in South Africa towards evangelising Darwinian naturalists. These may be called 'disinterest', 'sharing the plan of salvation' and 'attacking Darwinian evolution'.

The first attitude displays a complete ignorance of the problem and sees no reason to embark on any such missiological endeavour to share the gospel with Darwinian naturalists. It is seen as an unimportant sideshow. Perhaps many with this attitude are still living in the pre-apartheid era when Darwinism was not taught in schools (Wilmot & Wilson 2002:2).

The second attitude appears to be that Darwinian naturalists will be converted if the gospel alone is proclaimed and shared without any reference to what Darwinian naturalists believe. Whilst this may work in a few cases, it is not only a deficient missionary strategy but is geared towards a rapidly disappearing society where the majority had been exposed to the gospel through previous church connections. Therefore note need be taken of Glasser's (2003:11) comment:

Only if the church understands the full biblical revelation of God concerning the mission of God's people, stimulated by confronting Scripture with *today's questions*, will they ... offer to God the devotion of heart, strength, time, and resources essential to its completion. (p. 11; italics added)

The third attitude demonises Darwinian evolution and sees it as a major threat to Christianity. Lever (2002:31) attributes this mainly to developments in the three Afrikaans Reformed churches, stating that, '[a]s early as the 1920's they officially opposed Darwinism, seeing it as no more than a hypothesis, and a far-fetched one, at that' (Lever 2002:11). Whilst the majority of Reformed ministers in South Africa now seem to accept evolutionary Darwinism because they perceive that there is much scientific evidence that supports it and that it does not conflict with the biblical creation narratives (Van Dyk 2013:9), anti-evolutionists seem to be in the majority in the country and amongst lay membership in churches. As a whole, 'folk psychology' still rebels against the Darwinian message (Lever 2002:36, 37, 51).

As Van Dyk (2013:1) comments, radical creationist views are prevalent in South Africa. These are '... evident from the regularity with which southern African theologians and clergy are confronted by questions from ordinary or lay people regarding the age of the earth and biological evolution'. This tension has further been fuelled by the painful history of the so-called conflict between science and religion. Whether such a conflict is real or not, the idea that it exists has entered into common mythology. The tension has influenced such widely publicised atheists such as Hitchens (2008:26, 78) and has hardened the attitudes of many Darwinian naturalists towards the gospel.

This is not an irrelevant, minor matter. Jarvis (2008) may well be correct when he writes:

The watershed we face today presents us with a choice, either to slip down the slippery slope towards increasing conflict with vast numbers of people raised in our scientific and technological generation, or to be prepared to re-interpret our understanding of key passages in the Bible. (p. 7)

If it is accepted that Darwinian scientific naturalists constitute an unreached people group with different epistemological presuppositions from Christianity, then one key biblical passage that presents a model of how the church can effectively reach out to Darwinian naturalists in mission is found in the method adopted by Paul in Athens, as recorded in Acts 17:16–34. This may be summarised as a pre-evangelistic, apologetic approach, laying the foundation for more direct evangelism.

The fine-tuning shown in the Areopagus model for apologetic evangelism

The context and the culture

Acts 17 describes Paul's brief ministry at Athens in which he applied a balance of both apologetics and evangelism to an environment saturated with mainly by Epicureanism and Stoicism. Two problems with this record must be dealt with before proceeding.

The first problem is the authenticity of the Acts 17 speech. Dibelius (1956:155) has questioned its historical setting and whether it is actually Pauline. I would, however, accept Marshall's (1980:238ff.) arguments that, although Luke may have coloured the speech with his own language, it is essentially authentic and historical. Even if Dibelius' arguments are correct, the recorded speech is still a masterpiece of apologetic evangelism and provides an excellent model of this genre.

The second problem is whether or not it was a successful approach and has something to teach us. Ramsey (1962:252) argued that Paul's use of philosophical reasoning and pagan sources contributed to its ineffectiveness. This led to him being disappointed (Ramsey 1962):

... and perhaps disillusioned by his time in Athens. He felt that he had gone at least as far as was right in the way of presenting

his doctrine in a form suited to the current philosophy, and the result was little more than naught. (p. 252)

However, although Paul's approach to evangelising in this environment may not be a holistic missiological paradigm, it does offer one example of an approach that yielded some results (Rost 2004:114). These included the conversion of Dionysius the Areopagite, Damaris and others. As an Areopagite, Dionysius, a quite distinguished person, must have served as an archon in Ephesus. Furthermore, Paul successfully countered Stoic and Epicurean metaphysics with a thoroughgoing Christian alternative, thus demonstrating the use of an apologetic approach (Rost 2004:134).

It is particularly appropriate because Epicureanism is a materialistic philosophy (Bruce 1954:350, 351; Marshall 1980:283–284) which has many similarities with scientific naturalism. Epicurean philosophy was founded upon reason. Its adherents believed that only perceptions by means of the sense organs could provide the source of what is true and real. This Epicurean cosmology taught that the world was the result of the random motion and combination of atomic particles that are still constantly in motion (Cressey 1985:340). When these atoms collided, they formed the larger objects visible to man. Existence was totally material, and therefore, death is the end of existence. Numerous gods might exist as superior life forms (composed of atoms), but they have nothing to do with this world. They did not create the world, nor do they intervene in this world by means of miracles, which thus do not happen. They also do not guide its destiny, resulting in the absence of teleological providence and everything being a matter of chance (Rost 2004:116, 117, 124, 125).

Their philosophy has many points of similarity with that of Darwinian naturalists. As with Epicureanism, they mostly believe, as Davies (2007) says, that:

... there is no design, purpose or point to existence that would make any sense to human beings. There is no God, no designer, no teleological principle or destiny. Life in general, and human beings in particular are an irrelevant embellishment in a vast and meaningless cosmos, the existence of which is an unfathomable mystery. (pp. 295–296)

Darwinian naturalists, also having a materialistic philosophy, do not believe in either supernatural events or miracles. A supernatural event may be defined as one that has a supernatural source, such as the origin of the universe and its laws. Because it is supernatural does not necessarily mean it is miraculous if a miracle is defined as an exception to an already recognised normal course of things (see Hume 1777:X, 1; Lennox 2009:194)¹. To a Darwinian naturalist, the miracles recorded in the New Testament² 'seem to belong to a worldview foreign to modern man – a pre-scientific, superstitious worldview belonging to the ancient and middle-ages' (Craig 1994:127). Some, like Dawkins (1986:139ff.),

1. Not all theologians agree about these definitions. Nürnberger (2010:240, 241), for instance, does not agree with this differentiation between the miraculous and supernatural and regards the creation of the universe as miraculous.

2. Such as the 'signs' of John's gospel and the works of power recorded in the Synoptics and Acts.

whilst not explicitly stating this, would define miracles as, 'if they occur at all, as a tremendous stroke of luck'. This is a difficulty that has to be confronted when presenting the gospel since Christianity believes in a supernatural power that has created and sustains the universe and has as one of its focal points the resurrection of Christ, which is both supernatural and miraculous.

The missiological approach

So how did Paul present the gospel to these naturalists? Paul's preaching was always receptor oriented (Glasser 2003:304). He was adaptable in his missionary method. Even the language he used builds as much as possible upon the philosophies of the time (Dunn 1996:230). Thus at Athens, Paul's speech was fine-tuned to Greek philosophy. He appealed to the Greek philosophers by interacting with their thought, even quoting their own writers in a well-informed respectful way. Sensitivity is always an important part of the apologetic endeavour (Rost 2004:124).

He rejected the straightforward approach that he used with his Jewish fellow countrymen. His aim was to proceed from concepts with which the Epicureans were familiar. Then, on this basis, he would present them with what many would find much more difficult to accept, namely the need to repent of their sins and believe in the resurrected 'man', Jesus Christ. Even if they rejected this latter concept, at least he would have gained a hearing and left them with something to think about, which the Holy Spirit could use in their lives. This might be called as moving from the 'the God of the philosophers' to 'the God of the scriptures' method.

The proclamation is logically presented in an ordered and systematic fashion which would have appealed to these sophisticated academics. Rost's (2004:119) interpretation illustrates the point although it may be somewhat superimposed. He sees it as containing five doctrinal categories that flow in logical sequence: God (Ac 17:24, 25 – theology proper), man (Ac 17:26–29 – anthropology), salvation (Ac 17:30–31 – soteriology), Christ (Ac 17:31 – Christology) and final judgment (Ac 17:31 – eschatology).

The clinching argument he uses is that, as some of the Greek poets witness, the Creator God has created a hunger within us for himself which can only be satisfied by experiencing him. Paul uses God's revelation of himself in culture to build 'a bridge across which apologists could attempt to venture in the hope of drawing their audience to their own side' (Dunn 1996:236). It is also interesting to note that, as Dunn (1996:231) points out, Paul does not complicate matters by naming Jesus, calling Jesus God or mentioning the cross. This was true preparatory apologetics: fine-tuned to what he considered his audience could understand in one presentation.

Yet, despite the enculturation of his message, Paul's approach was rigidly controlled by his unwavering commitment to judgment and the need to accept the miracle of resurrection (Rost 2004:130). The seed was sown and then left to germinate.

Insights that may be acquired from Paul's approach

Many insights may be gained from examining Paul's approach. Paul's example of sensitivity and politeness are surely compulsory guidelines and were not just limited to him alone. The author of the first letter of Peter seems to echo this when he writes: 'Always be prepared to give an answer to everyone who asks you to give the reason for the hope that you have. But do this with gentleness and respect' (1 Pt 3:15). Like Paul, the author agrees that the stance of Christians toward unbelievers must never be merely passive or neutral. He encourages preparation for active witness which will win the unbeliever to Christ. It is interesting that the word that is translated with 'answer' in 1 Peter 3:15 in the NIV is 'απολογία' [apologia]. This word was used to indicate a defence against an accusation, whether formal or informal (Grudem 1988:84, 85). Paul presents an apologetic defence of Christianity in Athens that is well thought out (even prepared beforehand?) against the accusatory thinking of, particularly, the Epicureans. He does this with great courtesy whilst still confronting them with the need to respond to the miraculous resurrection of Jesus.

Such sensitivity then naturally leads to flexibility in presenting the gospel, which is only possible if one learns the thought patterns and language of the culture which is being addressed. Relevance and freshness of expression must be valued and cultivated. This requires intense listening, wide reading, painstaking analysis, deep reflection, persistent questioning and profound resolve. This sensitivity must mean starting where the hearers are in their epistemological assumptions and preparing their minds to understand the gospel's concepts. This may be difficult intellectual work and time consuming, but it is necessary if the listeners are to be fully converted. Sharing the gospel message is an aspect of the *missio Dei*. It is God's mission, and he converts, he alone.

Thus if the gospel is to obtain a hearing amongst Darwinian naturalists, the ground must be prepared properly. The one who shares the good news needs to gain the respect of the recipients by demonstrating that she has some understanding of cosmology and evolution. Then, once this trust has been established, the way is open for evolutionists to consider and think about the gospel. The challenge of believing in a miraculous religion and encountering the risen Christ cannot be avoided, but it will be far easier for Darwinian naturalists to accept if they discover that Christians are rational, educated people and not dogmatic obscurantists.

Sharing the gospel with Darwinian naturalists

The concept of cosmological fine-tuning

It may thus be concluded that the apostle Paul fine-tuned his presentation of the gospel at Athens in order to build epistemological bridges to those who were Epicurean in the receptor audience and that the Epicurean world-view may be classed as a form of proto-scientific naturalism. As such,

it may offer us an example of an apologetic approach that the church may use today to gain a hearing for the gospel amongst Darwinian naturalists that will be respected by them.

One such approach is that offered by the recently discovered cosmological concept of the 'fine-tuning' of the universe. This has given rise to the word play on 'fine-tuning' in this article where 'fine-tuning' is used ambiguously to refer to both missiological fine-tuning and cosmological fine-tuning. I suggest that the cosmological concept of fine-tuning be used to fine-tune the presentation of the gospel to Darwinian scientific naturalists.

A fine-tuned approach has the advantage that it does not directly attack the tenets of Darwinian naturalism. In similar fashion to Paul, it uses an apologetic that begins by demonstrating that the discoveries of modern cosmological science do not contradict belief in a supreme creator and even suggest that one may exist. The author takes the position of Romans 1:19: '... what may be known about God is plain to them, because God has made it plain to them'. Moo (1996) asserts, concerning this statement, that:

God in his essence is hidden from human sight, yet much of him and much about him can be seen through the things he has made ... Paul's wording suggests that all people actually may come to 'understand' something about God's existence and nature. (p. 1)

Thus a preparatory apologetic in presenting the gospel to Darwinian scientific naturalists may be both plausible and productive, especially if it uses the latest scientific discoveries.

The scientific discoveries of the last 50 years have led to, the words of McGrath (2009), a:

... growing realization of the extra-ordinary contingency for the initial conditions of the Universe, if heavy elements, planets and ultimately complex life were to develop. The life-bearing properties of the universe are highly sensitive to the values of the fundamental forces and constants of nature. (p. xi)

This has led many to speak of the 'fine-tuning' of the universe so that it could exist in the form we know it and then support life as we know it.

Although the modern scientific interpretation of these discoveries may yet prove to be incorrect, it is only rational and logical that, because they are supported by much currently accepted evidence, they be given the same weight in persuading people in making metaphysical choices as the contemporarily accepted Darwinian theory of evolution. Only three of these discoveries are shared below. They may not convert anyone, but they should give some pause for thought because they all have implications, demonstrating that the closed system of Darwinian naturalism may not be the only explanation concerning the ordering, purpose and origin of the universe.

The potential of using this missiological approach in today's world

Humanly speaking, cosmological fine-tuning has the potential to convince because today many eminent scientists,

mathematicians and philosophers accept it as valid. Moreover some atheists and Darwinian naturalists admit that it is difficult to refute its implications. Collins, a bio-physicist and geneticist noted for his discoveries of disease genes and his leadership of the Human Genome Project, is reported as stating that Dawkins, an eminent atheist and scientific naturalist, admitted to him that the most troubling argument for nonbelievers to counter is the fine-tuning of the universe (Vu 2011:n.p.).

Fine-tuning does not prove that a Christian God exists but is compatible with the Christian view of God. It is deeply suggestive that such a being may be believed to exist and may be believed in by scientists and the like without having to commit intellectual suicide or have a schizophrenic, compartmentalised view of time-space reality since it is a rational explanation for fine-tuning. It is intellectually consistent with the Christian concept that God exists outside of nature, space and time. As such, God could at the moment of the creation of the universe have determined details about the formation of the stars, planets, galaxies, chemical constants and reactions, physics, geology and biology that led to the formation of life on earth and the development of life forms (Collins 2007:205).

A detailed consideration of three scientific discoveries that suggest cosmological fine-tuning

The discovery that the universe probably had a beginning

The cosmological fine-tuning concept has its origin in the discovery that it appears that the universe had a beginning and has not existed forever. The majority of cosmologists and astronomers now accept that the best, most convincing scientific evidence indicates that the universe had a beginning. Evidence from the red shift³ in the light from remote galaxies, the residual cosmic microwave background and thermodynamics has led scientists to formulate the 'Big-Bang' model of the universe (Davies 2007:61ff.; Lennox 2009:67). The red shift appears to show that the universe is expanding at an incredible speed with all the stars and galaxies shooting away from each other (McGrath 2009:112ff.).

Projecting the trajectories of these galaxies backwards in time and space seems to indicate that, before 12–13.5 billion years ago, there was nothing and that the universe began in a singularity⁴ that rapidly expanded (Hawking 2002:23ff.). It is thought, on the basis of theoretical modelling by mathematicians and physicists, that, within less than a split second, the temperature hit a 100 000 million degrees centigrade (Davies 2007:63ff.; Strobel 2004:114). Time, matter, the fundamental forces of nature and energy originated in this hyper-cosmic explosion.

3.The red shift is the displacement of lines of the electromagnetic spectrum towards longer wavelengths (the red end of the spectrum) in radiation from distant galaxies. This is interpreted as a Doppler shift which is proportional to the velocity of recession and thus to distance.

4.A singularity is a point which has an infinite value, used especially in space-time when matter is infinitely dense. Russel (2007:200) describes it as 'an event without a cause!'

It is just a theory, and may be disproved, but the current, generally accepted theory that the universe had a beginning has serious cosmological implications. It limits the time in which the universe had to evolve and indicates that the initial conditions of time and space predetermined the values of its physical constants and the subsequent course of its development. Thus it prepared the way for the cosmological concept of fine-tuning.

It also has serious metaphysical implications. As Hawking (1988:46) comments: 'Many people do not like the idea that time has a beginning, probably because it smacks of divine intervention.' In fact, the implications of the Big Bang theory have convinced at least one eminent scientist of the existence of a Creator. Begley (1998:n.p.) quotes Sandage (held by some at the time to be the greatest astronomer in the world) as telling a conference at Dallas in 1985 that, although he had been an 'a sort of' atheist, he had decided to become a Christian at the age of 50. The reason was that he had come to believe that the Big Bang was a supernatural event that cannot be explained within the realm of physics as we know it.

The discovery that our universe could not exist without the initial fine-tuning of many of its physical constants

As stated above, recently discovered sets of cosmological data combined with physics and mathematical modelling appear to indicate that a complex, structured, ordered, universe, existing for the last 13.7 billion years, could not occur unless the physical constants that enable this had been fine-tuned.

One feature of our universe that indicates fine-tuning is that its temperature is amazing in its isotropy.⁵ It varies by less than one part in a thousand over the whole of its extent. At very early stages of the universe, however, the different regions of the universe were causally disjointed since light beams could not travel fast enough to connect the rapidly receding regions and thus even out the temperature. How then did these unconnected regions all happen to possess the same temperature and radiation density? Collins and Hawking (1973:317–314) have pointed out that, of all the possible values of physical constants, only an initial range could give rise to this observed isotropy of the actual universe (McGrath 2009:116). According to Craig (1990:127ff.), Penrose, the English mathematical physicist, has calculated that, in order to achieve this isotropy, the initial physical constants for this universe chosen from the set⁶ of all possible ones would have needed to be at least of the order of one part in 10^{123} (10 with 123 noughts after it, a figure that is too large to be contained within the known universe).

One of these physical constants is the force of gravity. The universe would not be a viable developing structure unless this was fine-tuned from the beginning. Physicist-

5.Isotropy is the property of a substance whereby it has the same properties wherever these are measured within it.

6.A 'set' is a mathematical term used to describe a collection of things that are considered to be similar in some way.

philosopher Collins (1998:n.p.) states that gravity (i.e. the gravitational force-constant) is fine-tuned to one part in a 100 million billion billion billion billion. If the force of gravity were a fraction less, all matter would fly apart, and there would be no stars or planets. If the force of gravity were a fraction greater, all matter would be a short-lived, solid ball (Hawking 1988:138).

The existence of the universe's billions of stars, vital for its continued survival and development, depends upon this fine-tuning. The theoretical physicist Smolin (1997), in the opinion of many cosmologists and the author, correctly comments:

The existence of stars rests on several delicate balances between the different forces of nature. These require that the parameters that govern how strongly these forces react be tuned 'just so'. In many cases a small turn of the dial in one direction, or another, results in a world not only without stars but with much less structure than our universe. (p. 37)

Some idea of the nature of this fine-tuning may be discerned from considering the relationship between the nuclear strong force, the electromagnetic force and the gravitational force. The nuclear strong force is that force which binds protons and neutrons together in the nucleus of an atom. The electromagnetic force causes protons to repel (Bradley 1999:n.p.). If the ratio of the nuclear strong force to the electromagnetic force had been different by one part in 10^{16} , no stars could have been formed. Again if the ratio of the electromagnetic force constant to the gravitational force-constant was increased by only 1 part in 10^{40} , only small stars could exist. If the ratio was decreased by 1 part in 10^{40} , only large stars could exist. Large stars are necessary to produce the heavy elements necessary for life. These they release in super-novae explosions to form new stars and planets. They tend to burn out quickly, however, measured in astrophysical or geologic time. Small stars last much longer, and thus, only they burn long enough to allow life to be sustained and develop, using the scattered elements produced in the large stars on a planet (Lennox 2009:70).

As Hoyle (1982), the well-known British astronomer, commented:

I do not believe that any scientists who examined the evidence would fail to draw the inference that the laws of nuclear physics have been deliberately designed with regard to the consequences that they produce inside stars. (p. 20)

The discovery that life could not exist without fine-tuning

For nearly 300 years now, it has been assumed that no special initial conditions were required for the emergence of a life-bearing universe. Yet recent cosmological discoveries, especially in the area of physics, have indicated that 'an extra-ordinary degree of contingency' was needed for the first conditions of the universe if heavy elements, planets and complex life were to emerge (Davies 2007:56; McGrath 2009:xi). As Davies (2007) comments:

To permit life in at least one place of the universe, three basic requirements must be satisfied:

- The laws of physics should permit complex structures to form
- The universe should possess the sort of substances that, such as carbon, that biology uses.
- An appropriate setting must exist in which the vital components come together in the appropriate way. (p. 151)

In fact, not only did the universe need to be 'fine-tuned' in order to exist as we know it but also in order to produce complex life (McGrath 2009:xi). (For a concise summary of four key elements contributing to this, see Pretorius 2013:2.) A universe that can support life is far more constrained than had been previously thought and is suggestively accommodating to the formation of life. There is a vital connection between certain fundamental principles of biology and astrophysics (McGrath 2009:125, 126). It would appear that the fundamental properties of the chemical elements which are exploited, but not created by biological processes and perhaps evolution, needed to be established from the time of the Big Bang event.

The term 'anthropic principle' has been coined to describe this phenomenon. This is defined by the *Oxford Dictionary of English* (2010) as being 'that the theories of the Universe are constrained by the necessity to allow human existence'. Pretorius (2013) defines it, perhaps more helpfully, as follows:

In physics and cosmology, the Anthropic Principle is the collective name for several ways of asserting that the observations of the physical universe must be compatible with the life observed in it. (p. 2)

Two of these biochemically crucial elements are carbon and oxygen. Their nucleosynthesis⁷ within the heart of stars is therefore indispensable.

Carbon is the basis of life. Life cannot exist without the long stable chains it alone enables to be built such as DNA and RNA. No other element can provide this foundation for life – neither silicon nor any other. Although it is suggested that silicon might also support life, it does not have carbon's capacity to form the double or triple bonds needed to form the complex molecules and then amino acids et cetera that carbon forms (McGrath 2009:139, 140).

Carbon is produced by combining helium nuclei⁸ or the nuclei of helium and beryllium in the nuclear furnaces we call stars, and it is then released in super-novas. Helium is common and was produced in the Big Bang. Carbon is much rarer. For carbon to be formed from helium, the ground-state energy levels between helium and carbon have to be as they are. The difference is known as the 'strong coupling⁹ constant'. If there was even a 2% difference in this constant, the universe would not have been able to sustain life. If the

7.Nucleosynthesis refers to formation of atoms more complex and heavier than the hydrogen atom by fusion reactions in the stars.

8.A nucleus is the positively charged central core of an atom, containing most of its mass.

9.In physics, a coupling constant is a number that determines the strength of the force exerted in an interaction.

strong coupling constant were slightly smaller, hydrogen would have been the only element in the universe. If it was larger, all the hydrogen would have been converted to helium with the result that no long-lived stars that could produce the carbon needed to build life would have been formed (McGrath 2009:92).

The existence of unconverted hydrogen is essential for another reason. It is needed to combine with oxygen to form water (H₂O). Water is an essential building block of life. It plays a remarkable role as a biological solvent that cannot be replicated by any other solvent (such as ammonia or sulphuric acid) (McGrath 2009:152). However, as the chemical formula indicates, the existence of oxygen is also essential. A certain amount of the carbon produced in the stars is converted into oxygen but not all. If the strong coupling constant were any different, it would have resulted in either no oxygen being produced or no carbon being left to form life's complex molecules (McGrath 2009:92).

Important as they are, carbon and water are insufficient of themselves. Life also requires the elements found only in terrestrial planets, like earth, such as nitrogen, iron, copper and magnesium. These are heavier than hydrogen. These could only be produced by nucleosynthesis in large stars. This nucleosynthesis depends upon the critical values (discussed above) of the constants of nature which facilitated the formation of stars. Without stars, these biologically critical elements would not have formed (McGrath 2009:164).

In addition, as a final riposte to Darwinian scientific naturalists, not only does it appear that cosmological fine-tuning was necessary to produce life as we know it, or maybe any form of life, but it seems probable that it was also necessary to allow the evolution and development of life into complex forms – and then a consciousness that observes the cosmos in an analytical, interpretive fashion (Davies 2007:261ff.; McGrath 2009:167). However, the question must be asked: where did evolvability come from? The ability to evolve depends, amongst other factors, upon the long-term stability of DNA and proteins. DNA's capacity to encode information along with the mutational robustness conferring stability is critically dependent upon the organic chemistry of carbon. This is the carbon that the cosmological fine-tuning allowed to originate in the stars, which in turn depended upon the pre-set, fine-tuned physical constants of the universe! As Kingsley (1874:v-xxxiii) wisely commented many years ago, God indeed chose to 'make all things make themselves'.

In summary, the British astronomer Rees (2000), argues that just six precisely determined numbers, each of which is so precise that a minor variation would have made our universe and human life impossible, govern the emergence of human life in the aftermath of the Big Bang. He reluctantly concedes that science cannot explain this fine-tuning and that the reasons for it lie beyond anything within our universe. The evidence seems to suggestively underline the distinguished physicist Dyson's (1971:50) statement, combining the

cosmological and biological fine-tuning arguments: 'The more I examine the universe and the details of its architecture, the more I find that the universe in some sense must have known we were coming.'

Objections that may be encountered

As with the reception given to the apostle Paul in Athens (Ac 17:32), not all those who encounter this missiological approach will be receptive. Scientists and philosophers may reject the fine-tuning argument. Davies (2007:295) lists eight explanations (including intelligent design) that have been posited to account for astronomical fine-tuning, which for a lack of space is not discussed in this article. These have given rise to the four major objections to fine-tuning which are discussed very briefly below.

Some scientific naturalists believe the data is inaccurate, missing vital 'to be added' information or wrongly interpreted by physicists, astronomers and others. An example is Maddox (1989:425), a former editor of *Nature*, who rejects the 'Big Bang' hypothesis. Stenger (2011), using computer simulations, suggests that not all of the purportedly 'fine-tuned' parameters may be as fine-tuned as has been claimed.

However, the fact that Hawking and Mlodinov (2010:164) accept the validity of the data should be food for thought to the sceptics. Davies (2003:115), Britain's most eminent cosmologist, asserted: 'There is now broad agreement amongst physicists and cosmologists that the Universe is in several respects "fine-tuned" for life.' Collins (Vu 2011) himself has said:

... to get our Universe with all its potential for complexities of any kind for potential of any kind of life form, everything has to be precisely defined on the knife edge of improbability. (n.p.)

Polkinghorne (1998:76), a former Cambridge University physicist, endorses fine-tuning also quoting with approval Freeman Dyson: 'The more I examine the universe and the details of its architecture, the more evidence I find that the universe in some sense must have known we were coming.'

All these eminent scientists are thus endorsing the data and its metaphysical implications.

The approach has also recently been widely endorsed and publicised by two eminent and widely respected orthodox philosophers and theologians with a background in science and mathematics, namely Lennox (2009) and McGrath (2009) who have both debated with Dawkins. Moreover, the evidence for the fine-tuning of the universe has been influential in persuading some scientific naturalists that the universe cannot be explained unless a being exists who has created the universe. Those who have been persuaded include two of the world's former leading physicist-astronomers, namely Hoyle (1982) and Sandage (see Begley 1998).

Others may confuse the fine-tuning approach with the irreducible complexity argument that Pretorius (2013) ably

expounds, arguing that the Darwinian concept of evolution is fundamentally flawed because it cannot explain the intricate complexity of nature. The fine-tuning argument may be used to support intelligent design, but it is different for those arguments used to support irreducible complexity. This is illustrated in Paley's ([1802] 1836) famous argument for the existence of a creator based on design. Paley (*ibid*) distinguishes between cosmological or astronomical design and biological design although he argues that both suggest a Designer. The fine-tuning argument would be included in cosmological design whereas irreducible complexity is included under the biological argument. Many scientists believe that the biological argument has been refuted whereas the cosmological argument is far more difficult to rationally reject (Davies 2007:218ff.). Thus Collins, a professing Christian, believes that the fine-tuning argument indicates that there is a designer of the universe. Yet he does not support the irreducible-complexity argument, stating that it has the drawback of being 'a God of the gaps theory inserting a supposition of the need for supernatural intervention in places that scientists cannot explain' (Collins 2007:184).

Another argument is that some believe that the only reason we can see fine-tuning in the universe is because we are its consequence, and our brains that observe it would not have existed otherwise (see Dawkins 2006:164). They would see the fine-tuning argument as falling under the category of the anthropic principle. This argument may be refuted on two grounds. Collins's (2007:75) argument sees this explanation as simply another way of saying that we exist to see fine-tuning simply because 'we are very, very lucky', but the possibility of us existing by sheer chance is 'vanishingly small' and therefore implausible (Collins 2007:76; McGrath 2009:121). Lennox (2009:73ff.) refutes the anthropic principle because he sees it as a tautology, explaining nothing but only telling us that, for life to exist, necessary conditions must be fulfilled.

Lastly a 'speculative' sic (McGrath 2009:124; Polkinghorne 1986:80) theory has been created to explain the fine-tuning called the multiverse hypothesis. This was popularised by Deutsch (1997) and then has been espoused by Hawking and Mlodinow (2010) basing it on the hypothesis called 'string theory'. String theory proposes that all particles are connected by vibrating, miniscule, too-small-to-ever-see, multi-dimensional strings¹⁰ that are attached to membranes and are combined with the inflationary¹¹ model (see Davies 2007:118ff. for a detailed explanation). It proposes that there is a multiplicity of universes so that the life-friendly one we inhabit is an inevitability. This of course is a possibility, but it has as yet not been proven, and as Davies (2007:194) admits, it is 'an act of faith'. In fact, it verges on the metaphysical, and it cannot be tested by experiment or observation (*ibid*:196). At the moment, it seems to be an imaginative, theoretical response to the implications fine-tuning because it suggests to some cosmologists, physicists and scientists the existence of a Creator.

10. A simple description of one string theory is given by Hawking (2002:152ff.).

11. A simple description of the inflationary model is given by Hawking (2002:107ff.).

Conclusion

The attitude of many in the church towards Darwinian naturalism and the discoveries of modern science has been one of either ignorance or dismissal. The end result of this may well be that many who have accepted Darwinian evolution will perceive Christianity as out-dated and obscurantist. It may also lead some to abandon their Christian faith and others to doubt their faith and thus be unwilling to share it. In contrast, recent discoveries in cosmology, physics and biology may be used as proto-evangelism in order to remove misconceptions about Christianity so as to expand its influence amongst those who are scientifically literate. The discovery of the fine-tuning of the universe, amongst other recent discoveries, points the way to the conclusion that an intelligent supreme being created the universe. It may well indicate to the church how to fine-tune its gospel message to Darwinian naturalists. The church, by pointing out the scientific evidence for the God of the philosophers to Darwinian naturalists, may encourage them to become open to encounter the God of the Scriptures through the resurrected Jesus Christ, as Dionysius did at Athens. What happens then is a matter of man's free will and God's grace.

Furthermore the church should be encouraged since, because of our discovery that the universe is fine-tuned, we now know that biological processes are firmly rooted in the precise physical conditions of this universe. This suggests that the purpose and meaning of the physical universe may be found in the phenomenon of biological life. This allows us to believe that the capacity of human beings to respond to God's revelation has also been built into its fine-tuning (Russel 2007:201).

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References

- Begley, S., 1998, 'Science finds God', Newsweek, 20 July.
- Bosch, D., 1991, *Transforming mission*, Orbis Books, New York.
- Botha, N., 2011, 'Transforming missiology: A dialogue with some reviewers of David Bosch's *Transforming mission*', *Missionalia* 39(1/2), 18–31.
- Bradley, W., 2001, 'The "just so" universe: The fine tuning of constants and conditions in the cosmos', in W. Dembski & J. Kushiner (eds.), *Signs of intelligence: Understanding intelligent design*, pp. 157–170, Brazes Press, Grand Rapids, Michigan.
- Bruce, F., 1954, *The book of Acts*, Wm. B. Eerdmans Publishing Company, Grand Rapids, Michigan. (New International Critical Commentary).
- Collins, F., 2007, *The language of God: A scientist presents evidence for belief*, Pocket Books, London.
- Collins, R., 1998, 'The fine-tuning design argument: A scientific argument for the existence of God', viewed 21 September 2014, from <http://www.discovery.org/a/91>
- Collins, C.B. & Hawking, S., 1973, 'Why is the universe isotropic?', *Astrophysical Journal Letters* 180, 317–314. <http://dx.doi.org/10.1086/151965>
- Craig, W., 1990, 'The teleological argument and the anthropic principle', in W. Craig & M. McLeod (eds.), *The logic of rational theism: Exploratory essays*, Problems in contemporary philosophy 24, pp. 127–153, Edwin Mellen, Lewiston, New York.
- Craig, W., 1994, *Reasonable faith: Christian truth and apologetics*, Crossway, Wheaton, Illinois.

- Cressey, M., 1985, 'Epicureans', in J. Douglas (ed.), *New Bible Dictionary*, 2nd edn., p. 340, Inter-Varsity Press, Leicester.
- Davies, P., 2003, 'How bio-friendly is the universe', *International Journal of Astrobiology* 2(2), 115–120.
- Davies, P., 2007, *The goldilocks enigma*, Penguin Books, London.
- Dawkins, R., 1986, *The blind watchmaker: Why the evidence of evolution reveals a universe without design*, W.W. Norton, New York.
- Dawkins, R., 2006, *The God delusion*, Bantam Press, London.
- Deutsch, D., 1997, *The fabric of reality*, Penguin, London.
- Dibelius, M., 1956, *Studies in the Acts of the Apostles*, ed. H. Greeven, transl. M. Ling, SCM Press, London.
- Dunn, J., 1996, *The Acts of the Apostles*, Epworth Press, Peterborough.
- Dyson, F., 1971, 'Energy in the universe', *Scientific American* 224, 50–59.
- Fergren, G. & Numbers, R., 1996, 'C.S. Lewis on creation and evolution: The Acworth Letters, 1944–1960', *Perspectives on Science and Christian Faith* 48, 28–33.
- Glasser, A., 2003, *Announcing the Kingdom*, Baker Academic, Grand Rapids, Michigan.
- Grudem, W., 1988, *The First Epistle of Peter: An introduction and commentary*, Inter-Varsity Press, Leicester. (Tyndale New Testament Commentaries).
- Hawking, S., 1988, *A brief history of time: From the big bang black holes*, Bantam Press, London.
- Hawking, S., 2002, *The theory of everything*, New Millennium Press, Beverly Hills, California.
- Hawking, S. & Mlodinow, L., 2010, *The grand design*, Bantam Books, New York.
- Hitchens, C., 2008, *God is not great: How religion poisons everything*, Atlantic Books, London.
- Hoyle, F., 1982, 'The universe: Past and present reflections', *Annual Review of Astronomy and Astrophysics* 20, 1–35. <http://dx.doi.org/10.1146/annurev.aa.20.090182.000245>
- Hume, D., 1777, *Philosophical essays concerning human understanding*, A. Millar, London.
- Jarvis, M., 2008, *BIG BANG Christianity*, Fact and Faith Publications, Wellington.
- Kingsley, C., 1874, *The natural theology of the future*, Macmillan, London. (Westminster Sermons).
- Lacey, A., 1995, 'Naturalism', in T. Honderich (ed.), *The Oxford companion to philosophy*, pp. 604–606, Oxford University Press, Oxford.
- Lennox, J., 2009, *God's undertaker: Has science buried God*, Lion Publishing, Oxford.
- Lever, J., 2002, 'Science, evolution and schooling in South Africa', in J. Wilmot & L. Wilson (eds.), *The architect and the scaffold: Evolution and education in South Africa*, pp. 10–44, Human Science Research Council Publishers, Cape Town.
- Lewis, C.S., 1967, 'The funeral of a great myth', in W. Hooper (ed.), *Christian reflections*, pp. 82–93, Eerdmans, Grand Rapids, Michigan.
- Maddox, J., 1989, 'Down with the big bang', *Nature* 340, 425.
- Matthew, H., 1984, 'The liberal age (1851–1914)', in K. Morgan (ed.), *The Oxford illustrated history of Britain*, pp. 463–522, Oxford University Press, Oxford.
- Marshall, I., 1980, *The Acts of the Apostles*, Inter-Varsity Press, Leicester. (The Tyndale New Testament Commentaries, ed. R. Tasker).
- McGrath, A., 2009, *A fine-tuned universe*, Westminster John Knox Press, Kentucky.
- Moo, D., 1996, *The Epistle to the Romans*, Wm. B. Eerdmans Publishing Co., Grand Rapids, Michigan. (The New International Commentary on the New Testament).
- Nürnbergger, K., 2010, *Richard Dawkins' God Delusion*, Xlibris Corporation, Dartford.
- Ott, C., Straus, S. & Tennant, T., 2010, *Encountering theology of mission*, Baker Academic, Grand Rapids, Michigan.
- Oxford Dictionary of English, 2010, ebook, 2nd edn. Revised, C. Soanes & A. Stevenson (eds.), Oxford University Press, Oxford.
- Paley, W., [1802] 1836, 'Natural theology', in H. Brougham & C. Bell (eds.), *Paley's natural theology with illustrative notes* (1836), n.p., C. Knight, London.
- Polkinghorne, J., 1986, *One world*, SPCK, London.
- Polkinghorne, J., 1998, *Belief in God in an Age of Science*, Yale University Press, New Haven, Connecticut.
- Pretorius, M., 2013, 'The remarkable cell: Intelligently designed or by evolutionary process?', *Verbum et Ecclesia* 34(1), Art. #708, 8 pages. <http://dx.doi.org/10.4102/ve.v34i1.708>
- Ramsey, W., 1962, *St. Paul the traveller and Roman citizen*, Baker, Grand Rapids, Michigan.
- Rees, M., 2000, *Just six numbers: The deep forces that shape the universe*, Phoenix, London.
- Rost, S., 2004, 'Paul's Areopagus speech in Acts 17', in I. Hexham, S. Rost, J. Morehead & J.W. Morehead II (eds.), *Encountering new religious movements: A holistic evangelical approach*, pp. 113–136, Kregel Publications, Grand Rapids, Michigan.
- Ruse, M., 2003, 'Is evolution a secular religion?', *Science* 7 299(5612), 523–1524. <http://dx.doi.org/10.1126/science.1082968>
- Russel, R., 2007, 'Five key topics on the frontier of theology and science today', *Dialog: A Journal of Theology* 46(3), 199–207.
- Smolin, L., 1997, *The life of the cosmos*, Oxford University Press, New York.
- Stenger, V., 2011, *The fallacy of fine tuning*, Prometheus Books, Amherst, New York.
- Strobel, L., 2004, *The case for a creator*, Zondervan, Grand Rapids, Michigan.
- Tucker, R., 2012, 'Practical theological research into education and evolution in South African high schools: Teaching learners to think!', *Nederduitse Gereformeerde Teologiese Tydskrif* 53(1/2), 219–231.
- Van Dyk, P.J., 2013, 'The Bible and evolution: Opinions amongst southern African clergy and theologians from the Reformed church tradition', *Verbum et Ecclesia* 34(1), Art. #776, 9 pages. <http://dx.doi.org/10.4102/ve.v34i1.776>
- Vu, M., 2011, 'Francis Collins: Atheist Richard Dawkins admits universe's fine tuning is difficult to explain', *Christian Post*, viewed 27 September 2013, from www.christianpost.com
- Wilmot, J. & Wilson, L., 2002, 'Introduction', in J. Wilmot & L. Wilson (eds.), *The architect and the scaffold: Evolution and education in South Africa*, pp. 1–7, Human Science Research Council Publishers, Cape Town.