RICHARD DAWKINS AND THE DESIGN ARGUMENT
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Richard Dawkins is a passionate, persuasive writer, speaker, and broadcaster. He is Professor of the Public Understanding of Science at Oxford University and he is vitriolic in his dismissal of religious belief and the idea of God. In a series of books Dawkins has launched devastating attacks on the evils of religion, the inadequacy of religious believers, and, as he sees it, the bankrupt and irrelevant idea of God. Dawkins is a modern Darwinian - he is a biologist who considers that "the survival of the fittest" can explain all aspects of this world and all aspects of human behaviour and purpose. For Dawkins life has no meaning and no purpose - human beings are simply the creatures that have most successfully evolved to suit the conditions available and they have now moved on to be able to dominate and alter their environment. They are no longer simply products of the environment, they have transformed their environment and the ability to do this is something that has itself evolved.

One of Dawkins' early books was entitled The Blind Watchmaker. This referred to the famous argument put forward by William Paley in the 19th century which runs as follows:

1. Imagine you are crossing a heath and you find a watch. You might not know what the watch was for, but you would recognize that it has all the marks of contrivance and design. It is made up of wheels and cogs (this, of course, was before the days of digital watches) and, unlike a stone, it had clearly been made with care and with intelligence.
2. The world is rather like a great watch - it is even more complex than a watch and bears similar marks of contrivance and design. Birds, bees, butterflies, and the whole natural order show every sign of design and intelligence.
3. Just as the design of the watch clearly implies an intelligent designer, so the great design in the world implies a great designer.
4. This designer is God.

Dawkins ridicules this argument as he maintains that the only designer" that is needed is the principle of natural selection. All the beauty and order in the world is simply the product of evolutionary forces. The delicate intricacy of a coral reef with its myriad coloured fishes is merely the product of evolution which guides particular fish to evolve in particular ways to find niches in which they can survive and breed and avoid predators. As Dawkins puts it:

"Evolution has no long term goal. There is no long term target, no final perfection to serve as a criteria for selection... The criteria for selection is always short term, either simply survival or, more generally, reproductive success. The 'watchmaker' that is cumulative natural selection is blind to the future and has no long term goal."

Instead, therefore, of a God who has carefully produced an orderly and beautiful world in which human beings can live and develop, Dawkins sees a world that works according to the inexorable forces of natural selection.

In another book, The Selfish Gene, Dawkins maintains that the only basis for human actions is so that human genes can survive - indeed men and women are nothing more than the "machines" constructed by genes to enable the genes to replicate and live on. The genes of each species are in competition and within each species genes are in competition - the drive is, therefore, to reproduce successfully so that the genes may be passed on and thus survive. Dawkins says:

"We are survival machines – robot vehicles blindly programmed to preserve the selfish molecules known as genes".

Human beings have evolved to meet the conditions available. There is no purpose and no meaning to our existence except to replicate. Religion is based on a sense of personal inadequacy and the unwillingness to face the clear evidence of science. Human beings are unwilling to recognize their position as highly evolved animals and therefore have sought, from primitive times, to tell themselves stories that they have been created by a great father figure in the sky - this enables humans to think that their lives have meaning and significance when in fact this meaning is entirely lacking.

Dawkins understands human beings strictly in terms of biology - we have about 5 billion cells each containing 46 chromosomes. Each chromosome contains tens of thousands of genes. Our DNA is passed on through our genes and, therefore, there is a sense in which the real essence of who we are, our DNA, is transmitted when we breed. Our DNA lives on in our children and we preserve our DNA by breeding. Our DNA represents the very essence of who each human being is just as it represents the essence of every living thing in the world. Dawkins puts this as follows:

*"It is raining DNA outside. On the banks of the Oxford canal at the bottom of my garden is a large willow tree and it is pumping downy seeds into the air…. not just any DNA but DNA whose coded characteristics spell out specific instructions for building willow trees that will shed a new generation of downy seeds. These fluffy specks are, literally, spreading instructions for making themselves. They are there because their ancestors succeeded in doing the same. It's raining instructions out there. It's raining programmes; it's raining tree-growing, fluff-spreading algorithms. This is not a metaphor, it is the plain truth. It couldn't be plainer if it were raining floppy discs." (*The Blind Watchmaker 1986 p.111)

Peter Williams, a modern theistic philosopher, agrees with Dawkins that there is a strong analogy between DNA and a computer disc but he maintains that just as we know that computer programs come from minds, we should similarly assume that DNA comes from a mind - the mind of God. Science, he argues, falls silent when asked for an explanation for the ultimate nature of the natural laws that give rise to order and that generate the processes that brings DNA about. He quotes Michael Behe:

"If you search the scientific literature on evolution, and if you focus your search on the question of how molecular machines - the basis of life - developed, you find an eerie and complete silence." For example, the Journal of Molecular Evolution was *established in 1971, and is dedicated to explaining how life came to be at the molecular level. None of the papers published in* GME *has ever proposed a possible route for a single complex biochemical system to arise in a gradual step-by-step Darwinian process."*

This, however, is not a good argument against Dawkins - it is effectively a "God of the gaps" argument as it is maintaining that as scientists have not yet discovered how organic life forms from inorganic, then God must be responsible. This type of argument has been put forward by generations of theistic philosophers and scientists but it is vulnerable to the next scientific discovery which may discover the explanation for what is presently inexplicable. Williams maintains that a supernatural origin is required not for the DNA itself but for the processes which bring the DNA about:

"To say that Darwinian evolution cannot explain everything in nature is not to say that evolution, random mutation, and natural selection do not occur; they have been observed (at least in the case of microevolution) many different times..... I believe the evidence strongly supports common descent. But the root question remain unanswered; what has caused complex systems to form?" (M Behe Darwin's Black Box pp.175-6)

In other words, the principle of natural selection does not rule out belief in God - the question still remains as to where the whole system comes from and this, it is claimed, science cannot explain.

Dawkins sets up religious perspectives which are banal and then finds these an easy target to knock down. He shared a platform with John Polkinghorne and Peter Vardy in Manchester and London Universities in 2001 and in his presentation Dawkins gave the example of a U.S. Christian website which pointed to the following features of a banana as being designed by God:

- *Outward indicator of inner contents: green - not ready; yellow - ready; and black-over-ripe.*
- *It is curved toward the mouth.*
- *Has non-slip surface.*
- *Bio-degradable.*
- *Tab for removal of wrapper.*
- *Shaped for human hand.*
- *Perforated for ease of access.*
- *Pleasing to taste buds.*
- *It has a specially designed "unzipper" for ease.*
- *It is nutritious.*

Dawkins then proceeds to mock religious believers who hold such banal and foolish positions. Of course he is right, but challenging religious belief on the basis of an argument that a child of seven would not accept is hardly a position worthy of a serious thinker. He does the same in his argument against believers who claim their position is rational because it cannot be disproved:

"Theists say: 'You can't prove a negative... Science has no way to disprove the existence of a supreme being.' (this is strictly true). Therefore, belief or disbelief in a supreme being is a matter of pure, individual inclination, and both are therefore equally deserving of respectful attention! When you say it like that, the fallacy is almost self-evident; we hardly need spell out the reductio ad absurdum. As my colleague, the physical chemist Peter Atkins, puts it, we must be equally agnostic about the theory that there is a teapot in orbit around the planet Pluto. We can't disprove it. But that doesn't mean the theory that there is a teapot is on level terms with the theory that there isn't. Now, if it be retorted that there actually are reasons X, Y, and Z for finding a supreme being more plausible than a teapot, then X, Y, and Z should be spelled out."

This simply will not do - as Wittgenstein said "for a blunder, that's too big."[2] There is not a single serious theologian in Christianity, Islam, or Judaism who thinks that God is in any way whatever like a teapot or any other sort of physical object located at a particular space and time. As this book has made clear, theologians are far more sophisticated than this. God is the god of the Universe and transcends the normal categories of objects within the Universe. God is *de re* necessary, necessary in and of God's self and in a completely different category to physical objects. Also, no religious believers speak as Dawkins portrays them as speaking. It may be true that there is no good scientific evidence for God (and in demanding this Dawkins is showing that he is a closet verificationist) but that does not mean that there are not good reasons to believe in God and that these reasons cannot be evaluated, probed, examined, and questioned - as this book has attempted to do. Dawkins' lack of awareness of theology and also of the profound philosophical thought that, for more than 2000 years, has engaged with and been preoccupied by the issue of God's existence radically undermines the effectiveness of his attacks.

In his latest books, Dawkins has developed a real spiritual sense grounded in a feeling of awe and wonder at the Universe:

*"The spotlight passes but, exhilaratingly, before doing so it gives us time to comprehend something of this place in which we fleetingly find ourselves and the reason that we do so. We are alone among animals in being able to say before we die: Yes, this is why it was worth coming to life in the first place..." (*Unweaving the Rainbow pp.312-3)

"After sleeping through a hundred million centuries we have finally opened our eyes on a sumptuous planet, sparkling with color, beautiful with life. Within decades we must close our eyes again. Isn't it a noble, enlightened way of spending our brief time in the Sun, to work at understanding the Universe and how we have come to wake up on it." (op. cit. p.6)

Dawkins, however, is quick to refute suggestions that this sense of wonder has anything in common with religion - indeed he is dismissive and highly critical of those scientists who, he sees, as "cashing in" on religious interest in science and who connect a sense of wonder and awe at the Universe with some form of religious imperative. For Dawkins, the Universe is a blind accident, but nevertheless something about which human beings can rightly wonder in the short time that we are alive.

Dawkins is dismissive of those theistic philosophers who argue that the sheer improbability of the world makes it likely that there is a God. Richard Swinburne is one philosopher who asks his reader to imagine a madman who kidnaps his victim and ties him to a chair underneath which is some explosive. This explosive is attached to ten machines, each of which shuffles a pack of playing cards. The madman leaves his victim saying to him that the explosive will detonate unless each of the randomly shuffled packs of cards comes up with an ace of hearts. The chances of this happening are incredible small - 144,555,105,949,057,024 to one.[3] The victim waits, watching the cards. When the explosive does not go off and the victim sees that every single one of the cards has come up with the desired ace, he will be convinced, argues Swinburne, that this could not have happened by chance. The card shuffling machines must have been fixed in some way, it cannot just be an accident. Similarly, argues Swinburne, the chances of the exact conditions being present for human beings to exist are so slim that there must have been *a* designer - namely God.

Russell Stannard, former Professor of Theoretical Physics at The Open University gives a similar example. Imagine that a prisoner is blindfolded and taken before a firing squad. The firing squad is made up of trained marksmen - they never miss. The marksmen all take aim at point blank range and they all fire, and every single one of them misses. Surely, Stannard argues, the prisoner would be right in thinking that this was not merely chance - someone must have given orders that the marksmen would miss. It is simply too improbable that every single one could do so as a result of chance. Dawkins rejects these arguments and sees them as being based on a false and naive premise.

The difference between Swinburne and Dawkins can be explained by the following example. Imagine that ten packs of cards are shuffled and the cards that appear are:

5H; 7C; 2S; AD; 2D; QS; 9C; KH; 2D; 5H

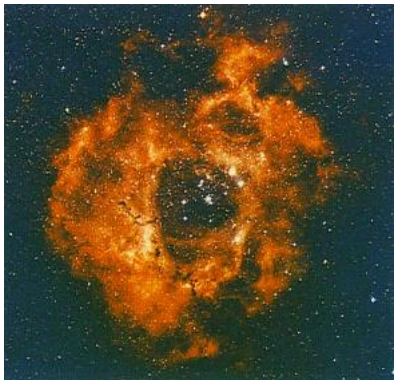
1. The odds of this combination coming up are astronomical. Swinburne and Stannard claim that the chances of human beings having evolved are similarly slim and, therefore, an intelligence must be assumed that arranged conditions so that this incredibly unlikely scenario comes into being.
2. Dawkins, by contrast, maintains that the cards are just what happened to come up. Similarly human beings are just what happened to evolve to suit the conditions available. The error, he would maintain, made by Swinburne is to work back from the existence of human beings and to wonder at the unlikelihood that the conditions are just right for us whereas, for Dawkins, we are the accident of evolution. In fact, to talk of the "accident" of evolution is slightly misleading as evolution, based on survival of the fittest, favors those species that are best adapted to the conditions that exist and that is why human beings are here now.

What Dawkins fails to address is the question why there is a Universe at all and why there are natural laws that enable evolution to take place. He fails to ask why the natural laws are as they are and why they are so finely balanced to produce life. He fails to address the issue of why the world is saturated with beauty'[1] not just at the macro but also at the micro level. These are questions about which science falls silent and atheists have to say,

as Bertrand Russell does, that the Universe is simply a brute fact which does not require an explanation. David Hume put this position well when he said that the Universe may be **ordered** but this does not mean that it is **designed.** Hume, as an atheist, accepts that the world is ordered but considers that this order results from mere chance - his position is, therefore, very similar to that of Richard Dawkins. Given modern developments in science, however, this position is becoming increasingly difficult to hold. Two factors, in particular, need to be assessed before the "brute fact" hypothesis can be considered:

A) THE ORIGIN OF THE UNIVERSE

There is no firm agreement to explain the origin of the Universe. The "Big Bang" theory still seems the most likely, but there are now a range of competing theories.



The Big Bang, it is suggested, was an initial singularity which exploded at a rate faster than the speed of light. Nuclear explosions took place giving rise to concentrations of hydrogen and helium and some of the lithium found in inter-stellar space. After about300,000 years, the initial fireball dropped to a temperature a little below the present temperature of the Sun allowing electrons to form orbits around atoms and releasing photons or light. The Big Bang theory first came to prominence as the initial explosion can today be measured as background radiation at microwave frequencies equivalent to a temperature of about 2.7 kelvin (the kelvin scale begins at absolute zero and this temperature is equivalent to 273.16 degrees centigrade).

The Big Bang theory appears to explain a great deal, but recent observations also cast doubt on it:

1. The Bubble Space telescope has been measuring distances to other galaxies and these observations suggest that the Universe is much younger than the Big Bang theory implies. This is because the Universe is expanding much faster than previously assumed - this implies a cosmic age of as little as eight billion years - about half the current estimate. On the other side, other data indicates that certain stars are at least 14 billion years old.
2. Big Bang theorists maintain that the initial explosion was extremely smooth - this is based on the uniformity of the background radiation left behind. However Margaret Geller, John Huchra, and others at the Harvard-Smithsonian Centre for Astrophysics have found a great wall of galaxies about 500 million lights years in length across the northern sky. These seem difficult to explain based on a uniform Big Bang.

Nevertheless the Big Bang theory still seems the most plausible explanation for the origin of the Universe. What is extraordinary, however, about the Big Bang is that for any stars and galaxies to be formed, the initial explosion had to occur within incredibly tight limits. If the initial explosive force of the Big Bang had been a tiny fraction less then the Universe would have collapsed in on itself in a comparatively short period of time - certainly before stars could form. If the initial explosive force had been a tiny fraction more than it was, then the Universe would have expanded at such a rate that, again, no stars could form. What is more, the elements making up the Big Bang had to be in such a fine balance that even the slightest deviation would have prevented the nuclear fires that cause stars to give off heat and, therefore, prevented planets forming. All these factors have to be so finely balanced for any stars and planets to form and the chances of them being present in just the right balance are correspondingly astronomically small. There are only two plausible ways to explain this:

1. That there are an infinite number of Universes and this Universe just happens to be the one, out of the infinite number that exist, where stars can form and where life can be possible. A number of scientists take this view but this is no evidence for it in that, as Professor Stannard points out, it is not possible to provide

evidence of alternative Universes other than the one we inhabit. The claim to there being alternative Universes is, then, a faith claim - it is not a scientific claim.

2. To claim that there is an intelligence that brings about the precise conditions necessary for stars, planets, and the Universe itself to form to provide the conditions necessary for life. This intelligence, of course, is the God claimed to exist by Christians, Muslims, and Jews.

The situation today, therefore, is that far from God being a far-fetched hypothesis put forward by religious believers who fail to engage with science, the existence of an intelligent designer for the Universe is highly persuasive.

B) CONDITIONS FOR LIFE TO EVOLVE ON EARTH

Richard Dawkins argues that natural selection and evolution can explain the existence of all life on Earth. This may well be the case, but this leaves open wider questions which Dawkins does not address. First there is the issue of why evolution and natural selection exist at all. If these are as effective as many, including Dawkins, claim, then why does such a sophisticated arrangement exist? It is one thing to argue, as the previous section did, that the conditions needed for the Universe to form have to be incredibly precise and are thus incredibly unlikely in the absence of a guiding intelligence, but even more unlikely (if that is possible) is the existence of the forces necessary for life to form.

One group of scientists, under the leadership of James Lovelock, have put forward the GAIA hypothesis (the name "Gaia" comes from the Greek Earth-goddess of that name) which sees the world as a single entity and makes the extraordinary claims that Gaia herself manipulates and engineers the conditions necessary for life. This is a quite remarkable claim. It maintains that planet Earth, Gaia herself, is engaged in planetary engineering to foster the conditions necessary for life. Clearly scientific argument is needed to support this.

Life first appeared on Earth more than a hundred million years ago yet in this time the Earth's climate has changed very little. The chemical composition of the seas and the atmosphere runs quite against what we would expect. Lovelock argues that the atmosphere is a biological construction - a living system engineered to maintain a chosen environment. The whole is maintained at an equilibrium from which even a tiny departure could have disastrous consequences for life. This is the reverse of randomness - the chosen environment is maintained within very tight limits to provide the ideal conditions necessary for life and the Gaia scientists maintain that these conditions are the result of manipulation and engineering. Instead of Nature being seen as a primitive force that needs to be subdued, Gaia should be seen as a complex entity involving biosphere, atmosphere, oceans, and soil - a living organism, maintaining and sustaining itself.

Lovelock claims that if evidence is required for the work of Gaia-type processes, in other planets than Earth this evidence would be found on other planets where entropy is reversed. Entropy is based on the second law of thermodynamics and sees the Universe gradually moving to a state of equilibrium where all heat dies out and complexity declines. On Earth exactly the reverse is happening and this can only occur, according to the Gaia scientists, because planetary engineering is taking place. James Lovelock cites a whole series of factors that provide evidence for this planetary manipulation and engineering including:

AIR – OXYGEN

If there is less than 12% oxygen in the atmosphere then no fires could be lit. If there is more than 25% oxygen then fires would never go out - even damp leaves will go on burning once a fire is started so the whole planet would burn. Unless oxygen is between 12-25% life would not be possible. Gaia scientists argue that the planet Gaia has "designed" the oxygen level to be as it is (21%) and alters the conditions necessary to sustain this. On Venus and Mars there are only trace percentages of oxygen - indications of worlds where Gaia does not operate. As Lovelock puts it:

"The chemical composition of the atmosphere bears no relation to the expectations of steady-state chemical equilibrium. The presence of methane, nitrous oxide, and even nitrogen in our present oxidizing atmosphere represents violation of the rules of chemistry to be measured in tens of orders of magnitude. Disequilibria on this scale suggest that the atmosphere is not merely a biological product, but more probably a biological construction; not living, but like a cat's fur, a bird's feathers, or the paper of a wasp's nest, an extension of a living system designed to maintain a chosen environment. Thus the atmospheric concentration of gases such as oxygen and ammonia is found to be kept at an optimum value from which even small departures could have disastrous consequences for life." (James Lovelock, GAIA: A new look at life on Earth, p.9)

Sources of high potential, whether chemical or electrical, are dangerous. Oxygen is particularly hazardous. Our present atmosphere, with an oxygen level of 21%, is at the safe upper limit for life. Even a small increase in concentration would greatly add to the danger of fires. The probability of a forest fire being started by a lightning flash increases by 70% for each 1% rise in oxygen concentration above the present level. Above 25% very little of our present land vegetation could survive the raging conflagrations which would destroy tropical rain forests and arctic tundra alike (Gaia: A new look at life on Earth, p.65). What is more, this percentage has remained unchanged for hundreds of thousands of years and this is not an accident.

TEMPERATURE

The Earth spins before the vast heat of the Sun whose temperature has risen by 30% in 350 million years. Yet throughout this same period the overall temperature of the Earth (in spite of Ice Ages in some places) has not varied by more than a few degrees and life has always been able to survive. Even the ice ages only affected 30% of the planet. The Gaia scientists maintain that the planet actively manages the temperature - even though they are not yet clear on the mechanisms that achieve this result. It could not have been a random process. If, for instance, methane had been produced to retain more heat, runaway heating would have occurred which would have destroyed life. Darker plants absorb more heat and these may well have been present in the early days with gradual change over the eons to reflect more sunlight - thus regulating the temperature by reference to how much heat is absorbed.

SALT

If there is more than 6% salt in tissue, life is not possible. Even in brine pools (pools with very high salt contents) the forms of life have a watertight membrane to keep the internal saline levels below 6%. For hundreds of millions of years rivers have poured over the land taking incredible quantities of salt into the sea (when this does not happen there are devastating effects as salt builds up and almost all plant life dies - as happens, for instance, in areas of Australia where dams and irrigation schemes prevent water flowing to the sea). One would therefore have expected the level of salt in the sea to keep rising inexorably so that life in the sea would become impossible - yet the reverse has happened. For 350 million years the percentage of salt in the sea has been 3.4%. We know that salt is continually

running off from rivers into the sea and being thrust up by undersea volcanoes. The percentage should have at least doubled. It has not.

So where does the salt go to? The amount of salt washed off the land every 80 million years is equal to the amount of salt in the sea now - but the oceans have existed for well over twice as long as this. A means must exist for salt to be removed from the sea. The mechanisms that make this happen are still unclear but Lovelock suggests the following:

1. The falling shells of tiny marine creatures act like a continual rain through the sea - these may take salt with them as they fall, just as dust is removed from the air by rain.
2. Gaia itself may construct lagoons and "cordon off" parts of oceans which then dry out (thus removing huge quantities of salt).

We have no more than partial answers and do not understand the processes but there seems no doubt that the processes are happening. Gaia is engineering the Earth to maintain its suitability for life, the processes it is using are as yet barely understood, but we now know they are there. As Lovelock says:

"The keynote, then, of this argument is that just as sand-castles are almost certainly not accidental consequences of natural but non-living processes like wind or waves, neither are the chemical changes in the composition of the Earth's surface and atmosphere which make the lighting of fires possible. ....how does it help us to recognize the existence of Gaia? My answer is that where these profound disequilibria are global in extent, like the presence of oxygen and methane in the air or wood on the ground, then we have caught a glimpse of something global in size which is able to sustain and keep constant a highly improbable distribution of molecules." (p.35)

If Lovelock and the Gaia scientists are right, then this world is not a random event. The Earth, Gaia herself, is manipulating and engineering the conditions necessary for life to emerge and to sustain and develop life once it does emerge.

When the above two arguments are put together (the sheer improbability of the precise composition of the singularity represented by the Big Bang and the Gaia hypothesis claiming that there are mechanisms at work to enable life to evolve) then Richard Dawkins' analysis seems to be not just inadequate, not just increasingly improbable but simply wrong. There are processes in place that demand an explanation. What is the origin of these processes? Why do they exist at all? Religious believers, of course, will be able to point to the activity of God but for those who reject God it is far more difficult as there is no obvious explanation of why these forces should be in place or even exist.

Conclusion

Even if a unified theory which formulates total knowledge of how the Universe operated is developed, then this would still not explain why there is a Universe or why it is orderly or why the conditions make it possible for life to evolve. These questions, philosophers and theologians maintain, are "too large" for science.

Scientific language marginalizes a whole way of looking at the world and of engaging with human beings with disastrous consequences. It is not just that scientific and religious languages are different - it is that science of the Dawkins variety seeks to reduce religious language to scientific language. It is thus reductionist and this reductionism impoverishes what is of profound significance for the human spirit.

Human beings seek constantly to exercise control over their lives but this control is at best illusory. Death is still inevitable and, in spite of scientific advances, so are illness, disease, and broken relationships yet the scientific paradigm minimises the importance of these or claims that, one day, they can be overcome. This, however, is a

fiction and is a denial of a central part of what it is to be human. Talk of God and of human beings in relation to God provides a different priority and a different way of locating human beings in the world in which they live.

If you start with the assumption that the material world is all there is and by saying this you will be satisfied to understand why things work as they do and are not interested in wider questions such as why they are there at all, then the atheist's position may be satisfying. However most people who think deeply about these issues will be not satisfied with these limited explanations and, if further reasons are demanded, then the existence of a guiding intelligence behind the Universe becomes far more plausible and this, of course, is precisely what Christians, Jews, and Muslims maintain is the case.

Those who reject this have to claim that:

1. There "just happens" to be an infinite number of Universes.
2. It "just happens" that we are in one of the few Universes, of the infinite number that exist, where not only stars and planets can form but where the precise conditions for life become possible.
3. It "just happens" that Gaia has the precise conditions needed for life to be developed and sustained.
4. It "just happens" that the world is incredibly beautiful at every level when there seems no good reason why this should be the case, and
5. It "just happens" that human beings have evolved to be capable of space flight and advanced science but also with a religious sense which is common across all human beings and which some psychologists maintain is an essential part of human fulfillment.

There perhaps comes a point when "ad hoc" assumptions that are individually so highly implausible become cumulatively difficult to sustain. At the very least, the idea of God is no longer one that can be regarded as a discredited and outmoded conception - it remains a live option which science does not in any way threaten and, perhaps, can increasingly sustain.

Notes

[2] Wittgenstein said this in the context of a non-Catholic grabbing the consecrated bread and wine at the eucharist, taking it off for laboratory analysis and then effectively saying "You see, Catholic claims to this being the body and blood of Jesus are absurd because it analyzes as bread and wine." This is, Wittgenstein points out, too big a blunder - the Catholic accepts that the material will analyze as bread and wine but still maintains that it is body and blood. Language is being used in a more sophisticated and complex way than the non-believer allows.

[3] This figure is arrived at by multiplying 52 (the number of cards in a pack) by 52 by 52 up to ten times for the ten packs of cards. The result is the number given.

[4] The early master of the Franciscan order, St. Bonaventure, put forward the idea that every creature is an expression of the Word of God - the divine fecundity outpouring from the love-relationship at the heart of the Trinity. The Word of God is the divine art - "ars suprema, ars Patris." Bonaventure, as Edwards points out, specifically talks of the Word of God as the Wisdom of God who bears in her womb the eternal thoughts of God (The God of Evolution p.120). Wisdom in creatures is like "a ray of light which penetrates through the window panes breaking up into many colors" (Lignum Vitae 46) "... every creature is of its very nature a likeness and resemblance of eternal wisdom" (Itinerarium 2.12). In the Franciscan tradition beauty is placed in the world to lure people toward God - it therefore has an explanation. For science, it is largely a matter of symmetry and has no meaning and no purpose.