Religion's misguided missiles

Promise a young man that death is not the end and he will willingly cause disaster

The following Richard Dawkins essay appeared in the popular U.K. news website,The Guardian on September 15, 2001, four days after the World Trade Center terrorist attack.

A guided missile corrects its trajectory as it flies, homing in, say, on the heat of a jet plane's exhaust. A great improvement on a simple ballistic shell, it still cannot discriminate particular targets. It could not zero in on a designated New York skyscraper if launched from as far away as Boston.

That is precisely what a modern "smart missile" can do. Computer miniaturisation has advanced to the point where one of today's smart missiles could be programmed with an image of the Manhattan skyline together with instructions to home in on the north tower of the World Trade Centre. Smart missiles of this sophistication are possessed by the United States, as we learned in the Gulf war, but they are economically beyond ordinary terrorists and scientifically beyond theocratic governments. Might there be a cheaper and easier alternative?

In the second world war, before electronics became cheap and miniature, the psychologist BF Skinner did some research on pigeon-guided missiles. The pigeon was to sit in a tiny cockpit, having previously been trained to peck keys in such a way as to keep a designated target in the centre of a screen. In the missile, the target would be for real.

The principle worked, although it was never put into practice by the US authorities. Even factoring in the costs of training them, pigeons are cheaper and lighter than computers of comparable effectiveness. Their feats in Skinner's boxes suggest that a pigeon, after a regimen of training with colour slides, really could guide a missile to a distinctive landmark at the southern end of Manhattan island. The pigeon has no idea that it is guiding a missile. It just keeps on pecking at those two tall rectangles on the screen, from time to time a food reward drops out of the dispenser, and this goes on until... oblivion.

Pigeons may be cheap and disposable as on-board guidance systems, but there's no escaping the cost of the missile itself. And no such missile large enough to do much damage could penetrate US air space without being intercepted. What is needed is a missile that is not recognised for what it is until too late. Something like a large civilian airliner, carrying the innocuous markings of a well-known carrier and a great deal of fuel. That's the easy part. But how do you smuggle on board the necessary guidance system? You can hardly expect the pilots to surrender the left-hand seat to a pigeon or a computer.

How about using humans as on-board guidance systems, instead of pigeons?

Humans are at least as numerous as pigeons, their brains are not significantly costlier than pigeon brains, and for many tasks they are actually superior. Humans have a proven track record in taking over planes by the use of threats, which work because the legitimate pilots value their own lives and those of their passengers.

The natural assumption that the hijacker ultimately values his own life too, and will act rationally to preserve it, leads air crews and ground staff to make calculated decisions that would not work with guidance modules lacking a sense of self-preservation. If your plane is being hijacked by an armed man who, though prepared to take risks, presumably wants to go on living, there is room for bargaining. A rational pilot complies with the hijacker's wishes, gets the plane down on the ground, has hot food sent in for the passengers and leaves the negotiations to people trained to negotiate.

The problem with the human guidance system is precisely this. Unlike the pigeon version, it knows that a successful mission culminates in its own destruction. Could we develop a biological guidance system with the compliance and dispensability of a pigeon but with a man's resourcefulness and ability to infiltrate plausibly? What we need, in a nutshell, is a human who doesn't mind being blown up. He'd make the perfect on-board guidance system. But suicide enthusiasts are hard to find. Even terminal cancer patients might lose their nerve when the crash was actually looming.

Could we get some otherwise normal humans and somehow persuade them that they are not going to die as a consequence of flying a plane smack into a skyscraper? If only! Nobody is that stupid, but how about this - it's a long shot, but it just might work. Given that they are certainly going to die, couldn't we sucker them into believing that they are going to come to life again afterwards? Don't be daft! No, listen, it might work. Offer them a fast track to a Great Oasis in the Sky, cooled by everlasting fountains. Harps and wings wouldn't appeal to the sort of young men we need, so tell them there's a special martyr's reward of 72 virgin brides, guaranteed eager and exclusive.

Would they fall for it? Yes, testosterone-sodden young men too unattractive to get a woman in this world might be desperate enough to go for 72 private virgins in the next.

It's a tall story, but worth a try. You'd have to get them young, though. Feed them a complete and self-consistent background mythology to make the big lie sound plausible when it comes. Give them a holy book and make them learn it by heart. Do you know, I really think it might work. As luck would have it, we have just the thing to hand: a ready-made system of mind-control which has been honed over centuries, handed down through generations. Millions of people have been brought up in it. It is called religion and, for reasons which one day we may understand, most people fall for it (nowhere more so than America itself, though the irony passes unnoticed). Now all we need is to round up a few of these faith-heads and give them flying lessons.

Facetious? Trivialising an unspeakable evil? That is the exact opposite of my intention, which is deadly serious and prompted by deep grief and fierce anger. I am trying to call attention to the elephant in the room that everybody is too polite - or too devout - to notice: religion, and specifically the devaluing effect that religion has on human life. I don't mean devaluing the life of others (though it can do that too), but devaluing one's own life. Religion teaches the dangerous nonsense that death is not the end.

If death is final, a rational agent can be expected to value his life highly and be reluctant to risk it. This makes the world a safer place, just as a plane is safer if its hijacker wants to survive. At the other extreme, if a significant number of people convince themselves, or are convinced by their priests, that a martyr's death is equivalent to pressing the hyperspace button and zooming through a wormhole to another universe, it can make the world a very dangerous place. Especially if they also believe that that other universe is a paradisical escape from the tribulations of the real world. Top it off with sincerely believed, if ludicrous and degrading to women, sexual promises, and is it any wonder that naive and frustrated young men are clamouring to be selected for suicide missions?

There is no doubt that the afterlife-obsessed suicidal brain really is a weapon of immense power and danger. It is comparable to a smart missile, and its guidance system is in many respects superior to the most sophisticated electronic brain that money can buy. Yet to a cynical government, organisation, or priesthood, it is very very cheap.

Our leaders have described the recent atrocity with the customary cliche: mindless cowardice. "Mindless" may be a suitable word for the vandalising of a telephone box. It is not helpful for understanding what hit New York on September 11. Those people were not mindless and they were certainly not cowards. On the contrary, they had sufficiently effective minds braced with an insane courage, and it would pay us mightily to understand where that courage came from.

It came from religion. Religion is also, of course, the underlying source of the divisiveness in the Middle East which motivated the use of this deadly weapon in the first place. But that is another story and not my concern here. My concern here is with the weapon itself. To fill a world with religion, or religions of the Abrahamic kind, is like littering the streets with loaded guns. Do not be surprised if they are used.

The Improbability of God

by Richard Dawkins

The following article is from Free Inquiry MagazineVolume 18, Number 3.

Much of what people do is done in the name of God. Irishmen blow each other up in his name. Arabs blow themselves up in his name. Imams and ayatollahs oppress women in his name. Celibate popes and priests mess up people's sex lives in his name. Jewish *shohets* cut live animals' throats in his name. The achievements of religion in past history - bloody crusades, torturing inquisitions, mass-murdering conquistadors, culture-destroying missionaries, legally enforced resistance to each new piece of scientific truth until the last possible moment - are even more impressive. And what has it all been in aid of? I believe it is becoming increasingly clear that the answer is absolutely nothing at all. There is no reason for believing that any sort of gods exist and quite good reason for believing that they do not exist and never have. It has all been a gigantic waste of time and a waste of life. It would be a joke of cosmic proportions if it weren't so tragic.

Why do people believe in God? For most people the answer is still some version of the ancient Argument from Design. We look about us at the beauty and intricacy of the world - at the aerodynamic sweep of a swallow's wing, at the delicacy of flowers and of the butterflies that fertilize them, through a microscope at the teeming life in every drop of pond water, through a telescope at the crown of a giant redwood tree. We reflect on the electronic complexity and optical perfection of our own eyes that do the looking. If we have any imagination, these things drive us to a sense of awe and reverence. Moreover, we cannot fail to be struck by the obvious resemblance of living organs to the carefully planned designs of human engineers. The argument was most famously expressed in the watchmaker analogy of the eighteenth-century priest William Paley. Even if you didn't know what a watch was, the obviously designed character of its cogs and springs and of how they mesh together for a purpose would force you to conclude "that the watch must have had a maker: that there must have existed, at some time, and at some place or other, an artificer or artificers, who formed it for the purpose which we find it actually to answer; who comprehended its construction, and designed its use." If this is true of a comparatively simple watch, how much the more so is it true of the eye, ear, kidney, elbow joint, brain? These beautiful, complex, intricate, and obviously purpose-built structures must have had their own designer, their own watchmaker - God.

So ran Paley's argument, and it is an argument that nearly all thoughtful and sensitive people discover for themselves at some stage in their childhood. Throughout most of history it must have seemed utterly convincing, self-evidently true. And yet, as the result of one of the most astonishing intellectual revolutions in history, we now know that it is wrong, or at least superfluous. We now know that the order and apparent purposefulness of the living world has come about through an entirely different process, a process that works without the need for any designer and one that is a consequence of basically very simple laws of physics. This is the process of evolution by natural selection, discovered by

Charles Darwin and, independently, by Alfred Russel Wallace.

What do all objects that look as if they must have had a designer have in common? The answer is statistical improbability. If we find a transparent pebble washed into the shape of a crude lens by the sea, we do not conclude that it must have been designed by an optician: the unaided laws of physics are capable of achieving this result; it is not too improbable to have just "happened." But if we find an elaborate compound lens, carefully corrected against spherical and chromatic aberration, coated against glare, and with "Carl Zeiss" engraved on the rim, we know that it could not have just happened by chance. If you take all the atoms of such a compound lens and throw them together at random under the jostling influence of the ordinary laws of physics in nature, it is *theoretically* possible that, by sheer luck, the atoms would just happen to fall into the pattern of a Zeiss compound lens, and even that the atoms round the rim should happen to fall in such a way that the name Carl Zeiss is etched out. But the number of other ways in which the atoms could, with equal likelihood, have fallen, is so hugely, vastly, immeasurably greater that we can completely discount the chance hypothesis. Chance is out of the question as an explanation.

This is not a circular argument, by the way. It might seem to be circular because, it could be said, *any* particular arrangement of atoms is, with hindsight, very improbable. As has been said before, when a ball lands on a particular blade of grass on the golf course, it would be foolish to exclaim: "Out of all the billions of blades of grass that it *could* have fallen on, the ball actually fell on this one. How amazingly, miraculously improbable!" The fallacy here, of course, is that the ball had to land somewhere. We can only stand amazed at the improbability of the actual event if we specify it *a priori*: for example, if a blindfolded man spins himself round on the tee, hits the ball at random, and achieves a hole in one. That would be truly amazing, because the target destination of the ball is specified in advance.

Of all the trillions of different ways of putting together the atoms of a telescope, only a minority would actually work in some useful way. Only a tiny minority would have Carl Zeiss engraved on them, or, indeed, *any* recognizable words of any human language. The same goes for the parts of a watch: of all the billions of possible ways of putting them together, only a tiny minority will tell the time or do anything useful. And of course the same goes, *a fortiori*, for the parts of a living body. Of all the trillions of trillions of ways of putting together the parts of a body, only an infinitesimal minority would live, seek food, eat, and reproduce. True, there are many different ways of being alive - at least ten million different ways if we count the number of distinct species alive today - but, however many ways there may be of being alive, it is certain that there are vastly more ways of being dead!

We can safely conclude that living bodies are billions of times too complicated - too statistically improbable - to have come into being by sheer chance. How, then, did they come into being? The answer is that chance enters into the story, but not a single, monolithic act of chance. Instead, a whole series of tiny chance steps, each one small enough to be a believable product of its predecessor, occurred one after the other in sequence. These small steps of chance are

caused by genetic mutations, random changes - mistakes really - in the genetic material. They give rise to changes in the existing bodily structure. Most of these changes are deleterious and lead to death. A minority of them turn out to be slight improvements, leading to increased survival and reproduction. By this process of natural selection, those random changes that turn out to be beneficial eventually spread through the species and become the norm. The stage is now set for the next small change in the evolutionary process. After, say, a thousand of these small changes in series, each change providing the basis for the next, the end result has become, by a process of accumulation, far too complex to have come about in a single act of chance.

For instance, it is theoretically possible for an eye to spring into being, in a single lucky step, from nothing: from bare skin, let's say. It is theoretically possible in the sense that a recipe could be written out in the form of a large number of mutations. If all these mutations happened simultaneously, a complete eye could, indeed, spring from nothing. But although it is theoretically possible, it is in practice inconceivable. The quantity of luck involved is much too large. The "correct" recipe involves changes in a huge number of genes simultaneously. The correct recipe is one particular combination of changes out of trillions of equally probable combinations of chances. We can certainly rule out such a miraculous coincidence. But it *is* perfectly plausible that the modern eye could have sprung from something almost the same as the modern eye but not quite: a very slightly less elaborate eye. By the same argument, this slightly less elaborate eye sprang from a slightly less elaborate eye still, and so on. If you assume a *sufficiently large number of sufficiently small differences* between each evolutionary stage and its predecessor, you are bound to be able to derive a full, complex, working eye from bare skin. How many intermediate stages are we allowed to postulate? That depends on how much time we have to play with. Has there been enough time for eyes to evolve by little steps from nothing?

The fossils tell us that life has been evolving on Earth for more than 3,000 million years. It is almost impossible for the human mind to grasp such an immensity of time. We, naturally and mercifully, tend to see our own expected lifetime as a fairly long time, but we can't expect to live even one century. It is 2,000 years since Jesus lived, a time span long enough to blur the distinction between history and myth. Can you imagine a million such periods laid end to end? Suppose we wanted to write the whole history on a single long scroll. If we crammed all of Common Era history into one metre of scroll, how long would the pre-Common Era part of the scroll, back to the start of evolution, be? The answer is that the pre-Common Era part of the scroll would stretch from Milan to Moscow. Think of the implications of this for the quantity of evolutionary change that can be accommodated. All the domestic breeds of dogs - Pekingeses, poodles, spaniels, Saint Bernards, and Chihuahuas - have come from wolves in a time span measured in hundreds or at the most thousands of years: no more than two meters along the road from Milan to Moscow. Think of the quantity of change involved in going from a wolf to a Pekingese; now multiply that quantity of change by a million. When you look at it like that, it becomes easy to believe that an eye could have evolved from no eye by small degrees.

It remains necessary to satisfy ourselves that every one of the intermediates on the evolutionary route, say from bare skin to a modern eye, would have been favored by natural selection; would have been an improvement over its predecessor in the sequence or at least would have survived. It is no good proving to ourselves that there is theoretically a chain of almost perceptibly different intermediates leading to an eye if many of those intermediates would have died. It is sometimes argued that the parts of an eye have to be all there together or the eye won't work at all. Half an eye, the argument runs, is no better than no eye at all. You can't fly with half a wing; you can't hear with half an ear. Therefore there can't have been a series of step-by-step intermediates leading up to a modern eye, wing, or ear.

This type of argument is so naive that one can only wonder at the subconscious motives for wanting to believe it. It is obviously not true that half an eye is useless. Cataract sufferers who have had their lenses surgically removed cannot see very well without glasses, but they are still much better off than people with no eyes at all. Without a lens you can't focus a detailed image, but you can avoid bumping into obstacles and you could detect the looming shadow of a predator.

As for the argument that you can't fly with only half a wing, it is disproved by large numbers of very successful gliding animals, including mammals of many different kinds, lizards, frogs, snakes, and squids. Many different kinds of tree-dwelling animals have flaps of skin between their joints that really are fractional wings. If you fall out of a tree, any skin flap or flattening of the body that increases your surface area can save your life. And, however small or large your flaps may be, there must always be a critical height such that, if you fall from a tree of that height, your life would have been saved by just a little bit more surface area. Then, when your descendants have evolved that extra surface area, their lives would be saved by just a bit more still if they fell from trees of a slightly greater height. And so on by insensibly graded steps until, hundreds of generations later, we arrive at full wings.

Eyes and wings cannot spring into existence in a single step. That would be like having the almost infinite luck to hit upon the combination number that opens a large bank vault. But if you spun the dials of the lock at random, and every time you got a little bit closer to the lucky number the vault door creaked open another chink, you would soon have the door open! Essentially, that is the secret of how evolution by natural selection achieves what once seemed impossible. Things that cannot plausibly be derived from very different predecessors *can* plausibly be derived from only slightly different predecessors. Provided only that there is a sufficiently long series of such slightly different predecessors, you can derive anything from anything else.

Evolution, then, is theoretically *capable* of doing the job that, once upon a time, seemed to be the prerogative of God. But is there any evidence that evolution actually has happened? The answer is yes; the evidence is overwhelming. Millions of fossils are found in exactly the places and at exactly the depths that we should expect if evolution had happened. Not a single fossil has ever been found in any place where the evolution theory would not have expected it, although this *could* very easily have happened: a fossil mammal in rocks so old

that fishes have not yet arrived, for instance, would be enough to disprove the evolution theory.

The patterns of distribution of living animals and plants on the continents and islands of the world is exactly what would be expected if they had evolved from common ancestors by slow, gradual degrees. The patterns of resemblance among animals and plants is exactly what we should expect if some were close cousins, and others more distant cousins to each other. The fact that the genetic code is the same in all living creatures overwhelmingly suggests that all are descended from one single ancestor. The evidence for evolution is so compelling that the only way to save the creation theory is to assume that God deliberately planted enormous quantities of evidence to make it *look* as if evolution had happened. In other words, the fossils, the geographical distribution of animals, and so on, are all one gigantic confidence trick. Does anybody want to worship a God capable of such trickery? It is surely far more reverent, as well as more scientifically sensible, to take the evidence at face value. All living creatures are cousins of one another, descended from one remote ancestor that lived more than 3,000 million years ago.

The Argument from Design, then, has been destroyed as a reason for believing in a God. Are there any other arguments? Some people believe in God because of what appears to them to be an inner revelation. Such revelations are not always edifying but they undoubtedly feel real to the individual concerned. Many inhabitants of lunatic asylums have an unshakable inner faith that they are Napoleon or, indeed, God himself. There is no doubting the power of such convictions for those that have them, but this is no reason for the rest of us to believe them. Indeed, since such beliefs are mutually contradictory, we can't believe them all.

There is a little more that needs to be said. Evolution by natural selection explains a lot, but it couldn't start from nothing. It couldn't have started until there was some kind of rudimentary reproduction and heredity. Modern heredity is based on the DNA code, which is itself too complicated to have sprung spontaneously into being by a single act of chance. This seems to mean that there must have been some earlier hereditary system, now disappeared, which was simple enough to have arisen by chance and the laws of chemistry and which provided the medium in which a primitive form of cumulative natural selection could get started. DNA was a later product of this earlier cumulative selection. Before this original kind of natural selection, there was a period when complex chemical compounds were built up from simpler ones and before that a period when the chemical elements were built up from simpler elements, following the well-understood laws of physics. Before that, everything was ultimately built up from pure hydrogen in the immediate aftermath of the big bang, which initiated the universe.

There is a temptation to argue that, although God may not be needed to explain the evolution of complex order once the universe, with its fundamental laws of physics, had begun, we do need a God to explain the origin of all things. This idea doesn't leave God with very much to do: just set off the big bang, then sit back and wait for everything to happen. The physical chemist Peter Atkins, in his

beautifully written book *The Creation*, postulates a lazy God who strove to do as little as possible in order to initiate everything. Atkins explains how each step in the history of the universe followed, by simple physical law, from its predecessor. He thus pares down the amount of work that the lazy creator would need to do and eventually concludes that he would in fact have needed to do nothing at all!

The details of the early phase of the universe belong to the realm of physics, whereas I am a biologist, more concerned with the later phases of the evolution of complexity. For me, the important point is that, even if the physicist needs to postulate an irreducible minimum that had to be present in the beginning, in order for the universe to get started, that irreducible minimum is certainly extremely simple. By definition, explanations that build on simple premises are more plausible and more satisfying than explanations that have to postulate complex and statistically improbable beginnings. And you can't get much more complex than an Almighty God!