The trojan horses: creationism and intelligent design, and what they mean for science

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ABSTRACT

This paper examines the threat to science from organized pseudoscience. It is easy to show that the general public's understanding of science is very poor. Therefore, determined people can advocate 'alternatives' to science which appear plausible to non-scientists. With skilful marketing, large sections of the public can be convinced that these alternatives should be taught in schools and universities, and that they merit funding for further research. The examples of creation science and intelligent design are considered. In both cases, the aim of these pseudo-sciences is to fundamentally alter the nature of science. Backed by large resources and vast numbers of supporters, it is suggested that movements like this can endanger science teaching and, eventually, the conduct of science itself. It is suggested that every scientist should be aware of the claims of these pseudo-sciences, and be in a position to offer basic refutations. In addition, it is necessary that specialists in the analysis and refutation of the pseudo-scientific claims should be available to offer further support.

Key words: Science; pseudo-science; religion; politics; creation; intelligent design.

Introduction

In some ways, the current position of science – and of zoology – is very strong. The importance of science for world development is not contested. Nor is the importance of scientific knowledge for ecological purposes, or simply as a source of understanding of how the world works. Further, as more and more nations develop their economies, it is likely that more resources will be available for science. Despite its importance, however, science is facing diverse threats.

Many of the papers in this special issue deal with threats to science from funding, politics or commercialisation. There is no doubt that funding cuts, political pressures and insistence on commercialisation are making the practice of science more difficult.

In this paper I want to deal with something rather different. I want to examine an explicit attempt to subvert the very nature of science, so that it functions in profoundly different ways. The people seeking these changes are both sincere and determined. Their attempts are partially covert, and it behoves every scientist to be aware of them.

Now many people believe that science should change in some way. Most scientists would argue that it should be better funded. Perhaps there should be less grantsmanship, or publication of trivial papers or careerism. Perhaps commercial interests should play less of a role, or more. All of these can be argued. The changes I refer to are quite different. In my view, these changes would prevent large parts of science from functioning at all. To understand the importance of the issue, I will start with two simple propositions.

Threats to science – the first proposition

The first proposition is that public understanding of science is extremely poor. Much evidence exists for this, yet many scientists find it hard to believe how dire the situation is. For example, it is hard to credit that the average member of a developed nation does not know the following elementary propositions to be true:

- The earliest humans did not live at the same time as dinosaurs
- Antibiotics do not kill viruses
- Lasers do not work by focusing sound waves
- It takes the Earth one year to go round the sun
- Electrons are smaller than atoms

These findings come from polls summarised on the United States National Science Foundation website (National Science Foundation 2009). It is tempting to conclude that the American citizenry is uniquely badly informed, and indeed many Americans flagellate their education system for being grossly unsatisfactory. However, this is not so. Europeans quizzed about the same topics came out, on the whole, as less knowledgeable than Americans, and there is some evidence that Russian and Chinese people do even worse (National Science Foundation 2009). In short, there is massive and widespread public ignorance about some of the most basic and elementary findings of science.

We can go a little further than this. If the public does not know much about scientific findings, it seems logical that they also know very little about how science actually works. The process of formulating theories and testing hypotheses would, we might expect, be largely unknown to most people. This is indeed the case. The subject has been less researched, but one poll showed that only about one-third of the general public could give any kind of a description of how science actually works. The ability to give such a description was related to education and scientific background, though not very strongly (National Science Foundation 2009).

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In short, we are justified in concluding that, for most of the population, science is an unknown quantity. The methods of scientific investigation and the findings of science are generally unknown. This should be a matter of concern because virtually all of the funds for scientific research come, directly or indirectly, from the wallets of the public. Academic and government science is, for the most part, supported by taxpayers' money, while research done for corporations is funded by incorporating the costs into the price of goods and services (e.g. Bridgstock 2000). Therefore, we might feel somewhat uneasy when we contemplate the paradox that people pay for science, but do not know what they are paying for.

An image of science

In my view, there is an image of science which aptly captures the paradoxical nature of its relationship to public understanding. Imagine science as a huge, partly-completed skyscraper which is being built in a thick fog. The different parts of the skyscraper are dependent upon each other, but the construction force is split into small groups. Each group knows about its own work and, more vaguely, that of adjacent groups, but they have no precise knowledge of the entire construction process. Beams are bolted into place, walls constructed, floors and windows installed by small separate groups. The enormous edifice grows steadily, without an overall plan or guiding intelligence[1].

What of the general public? They are told about the construction of the building. Their funds support it. Popularisers on the ABC and elsewhere try to explain what is going on. Many people pass the building every day, on their way to work. However, they cannot see the construction in the fog, and have no idea of its nature. Some people, indeed, doubt whether it exists at all, and wonder whether it is worth the money spent.

What do people actually see? At ground level there are doors to buildings, but it is not clear which ones genuinely lead into the clouds, and which lead to minor structures, only a few stories high. So the ordinary passer-by cannot tell which edifices are genuine and which are fakes.

Replacements for science – the second proposition

I now come to my second worrying proposition. There are people who are strongly committed to changing the nature of science entirely, and replacing it with something more to their liking. They do not accept the scientific method, disbelieve scientific findings, and argue that their own methods are more valid. What is more, they are organised, numerous and utterly determined to prevail.

In terms of my skyscraper analogy, these dissidents are seeking to construct alternative skyscrapers in the fog. They do not believe that science actually leads to any kind of truth. So they construct entrances to their own edifices,

Figure 1. "Each group knows about its own work and, more vaguely, that of adjacent groups . . ." Photo courtesy of Paulo Melo.

assuring all passers-by that this is the way to truth. Their goal is to convince large numbers of people that they have the genuine article.

Perhaps the best-known of these groupings are the creation scientists[2]. The modern creation science movement – it has roots stretching centuries back into history – began with the publication in 1961 of a book *The Genesis Flood* (Whitcomb and Morris 1982[1961]) which explicitly set out to change the entire nature of science. John C. Whitcomb was a fundamentalist theologian, while Henry Morris was a widely-known hydrological engineer who was also a biblical Christian. At the beginning of the book the authors state that certain discoveries and facts:

> *. . . amply warrant a serious study of the possibility of reorienting the pertinent scientific data within the framework of Biblical Creationism and Catastrophism.*
>
> *Whitcomb and Morris (1982[1961])*

The themes advanced in the book are essentially unchanged today. Creation scientists believe that the world and the universe are very young, probably of the order of 10,000 years. They believe that the Biblical book of Genesis provides a clear and reliable framework for researching the origins of the world. As a consequence, they believe that

1. Arguably, of course, the universe is the blueprint for the construction of science. However, it reveals itself only a little at a time to the builders.

2. There are others. Lysenkoism is one such example Graham 1993 , as is 'Aryan science' Gratzer 2000 . In my view, denial of climate change also belongs in this category, e.g. Oreskes and Conway (2010).

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the world was created in six days, and they will brook no attempts to alter this to six geologic ages: after all, Genesis quite clearly talks about days. They also believe that Noah's flood was a world-wide event which wiped out virtually all life on this planet, and was also responsible for laying down most of the geological strata, and also sorted the fossils into the order we observe today. Finally, the Tower of Babel incident dispersed humanity into many different races and tongues, accounting for the diversity which we see among humanity today (Bridgstock 1986: 81).

A scientist, upon encountering these claims, is likely to comment that they are religion not science, and unjustified by any evidence. However, such a dismissal will have no effect on the creation scientists, who believe with utmost seriousness that they are on a mission from God.

In Queensland, the Creation Science Foundation came close to having creationism made a part of science teaching (Knight 1985). At one stage, a panel of secondary school teachers was convened to decide how – not whether – creation science should be taught. They were addressed by a prominent creation scientist. Despite repeated requests, no mainstream scientists were allowed access to the panel. Only a unanimous view among the non-fundamentalists on the panel that creation could not be taught as science thwarted the plan (Taylor 1995).

Why does creation science differ from science? A check upon the articles of association of the Creation Science Foundation revealed the following assumptions, which all members of the Foundation were expected to believe:

> *The Bible is the written Word of God . . . Its assertions are historically and scientifically true in all the original autographs . . . The account of origins presented in Genesis is a simple but factual presentation of actual events* ***and therefore provides a reliable framework for scientific research into the question of the origin and history of life.***
>
> Bridgstock (1986: 81) *(bold added)*

In short, the creation scientists wish to alter the very nature of science, forcing it to conform in its basic tenets to the assumption of Biblical infallibility.

It is easy to dismiss creationism as unscientific nonsense. However, this would be a mistake. The creationists are not primarily trying to make a persuasive scientific case for their beliefs. Instead, they are seeking to make their views influential through political pressure. Indeed, at one stage no less than 23 American state legislatures were considering legislation which would have forced teachers in state schools to give equal time to teaching evolution and creation (Bridgstock and Smith 1986:7). This is an astonishing figure.

The fundamentalist perspective

why do they do it? Why do serious, religious people wish to replace science with a crude, religious-based alternative? Without going into the theological issues, Christian Protestants believe that religious belief is crucially important in deciding whether, after death, one is going to heaven or hell. For fundamentalists, this means that to be assured of heaven they must believe literally in the whole of the Bible. For fundamentalists the Bible is an indivisible, infallible, authoritative whole authored by God (e.g. Barr 1982). If they do not believe in the infallibility of the Bible, think fundamentalists, they are doomed to eternal damnation. They also fear that if their belief in any one part of the Bible wavers, then they may be set upon a slippery slope, leading to total disbelief, to atheism and to damnation (e.g. Barr 1982; Lebo 2008).

Some statistics may reinforce the view that creationism is a real danger to science. Estimates of the number of Christian fundamentalists vary (e.g. Numbers 2006; PollingReport 2009) but a reasonable estimate is that perhaps 25% of the United States population can be described in this way. That amounts to 75 million people, a substantial popular base for a political movement.

For the most part, fundamentalists' day-to-day concerns are similar to those of the rest of us. They have to earn a living, take care of their children and try to make sense of the bewildering world around them. Of course, they are likely to spend more time in prayer and Bible study than nonbelievers.

Naturally, fundamentalists are as concerned about the wellbeing of their children as anyone else. Therefore, they most earnestly seek to ensure that their children's Biblical faith is as strong as their own. From their perspective, this is the greatest contribution to their future welfare. Almost nothing can have any importance compared to the prospect of the agonies of infinite damnation.

Now imagine the distress of sincere fundamentalists when their children return from school and report that they have been learning godless doctrines which directly contradict belief in the Bible. It would clearly seem that schools are part of an evil conspiracy aimed at condemning millions of people to damnation. And indeed, many fundamentalists do believe that the Devil is behind these developments.

What can the fundamentalists do? One possibility is to move their children to a private school where the doctrines needed for salvation will be taught. However, many fundamentalists are not rich, and this may be beyond their means. So something has to be done, but what?

The creation science solution

Fundamentalists have tried a number of solutions to their terrible dilemma. Numbers (2006) describes these in some detail. They tried to ban evolution from schools. That led to the ridicule of the Scopes trial in 1925.They also tried to have religion – their religion, of course – taught in schools. This ran afoul of the first amendment to the US constitution, which forbids establishing a religion. In this paper we will look at the most recent developments. After the publication of Whitcomb and Morris's book in the 1960s, a powerful movement began in the United States which promised to meet the fundamentalists' concerns. The Genesis account of the origins of the world, it was suggested, was every bit as viable an account – speaking scientifically – as orthodox science. Therefore, logically, equal time should be given to teaching the two views of origins in school science lessons.

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Fundamentalists, of course, could see that if schools conceded that Genesis was a viable account of the origins of humanity then their children had a much better chance of avoiding damnation. Therefore the torrent of books, magazines and audiotapes which the creationists produced were eagerly snapped up by the millions of Biblical Christians in the USA and elsewhere. When creationist speakers turned up to argue their case in local churches, the fundamentalists took comfort from the fact that here were men of God, Biblical Christians who could espouse science and yet still remain true to God's word. When skilled creationist debaters faced supporters of evolution in formal confrontations, the fundamentalists would turn up in huge numbers to support their champions. Usually they were not disappointed: the torrent of half-truths and selective quotations used by creationist debaters would be more than enough to overwhelm scientific opponents (e.g. Lyons 1984:356).

Counterfeits in the fog

Earlier, we likened science to an incomplete skyscraper being constructed in a thick fog. How do these developments make sense in terms of the creationist surge for acceptance? Imagine the people in the street, passing the skyscraper but unable to see its full shape. At street level there are many doors, each claiming to be an entry into the skyscraper of scientific truth. How is the average person to tell which is the genuine entrance, and which leads to fakery?

For scientifically literate people there is no problem. They know how to tell genuine science from the fakes. Probably they know the best researchers in their areas of expertise. They also know the language, and can follow the reasoning in scientific papers. In terms of our image, they know exactly which door to enter. However, as we have seen, the vast majority of the population knows little or nothing about science.

Figure 2. Which door leads to genuine science? For the non-scientist, it can be hard to tell. Photo courtesy of Paulo Melo.

For fundamentalists there is also no problem. The prospect of damnation for themselves and those they love is quite terrifying. It is far more important, and far more immediate, than any talk about scientific method or findings. If one of the doorways to scientific truth also claims to be compatible with Biblical Christianity, they will choose it without hesitation. Their reasons should be obvious by now. And so it follows that support for the Trojan horse of creationist pseudo-science is likely to continue into the foreseeable future.

For the general public, without special knowledge, the attractiveness of the inducements to enter may be important. Creationists are very good at making their doctrines seem scientific. A plethora of creationist research centres, and creation scientists produce 'evidence' for their view. This is, quite literally, pseudo-science, but to many people it looks convincing. Science does not bother much about its PR. Creationists work hard at it.

At this point, some people are likely to want to protest. The evidence does not fit the creationist model, they will point out. Major inconsistencies exist which creationism simply cannot explain (Kitcher 1982; Futuyma 1983). Among knowledgeable scientists, the creation model would attract no support, as it simply does not help explain the evidence. This is true, but it does not affect the matter at all. The creationists are not interested in attracting the support of professional scientists (though they would like it). They are after popular support. Therefore they have created a plausible imitation of scientific knowledge which agrees with fundamentalists' religious beliefs (Kitcher 1982).

Creationists, therefore, do not bother with the arcane problems advanced by professional scientists. They glibly explain these away and focus on their selling points. I have engaged in debates with professional creationists, and it is completely unlike a discussion with professional researchers. Important points are ignored or rationalised away and cheep sneers replace serious arguments. At base, creation scientists are religious fanatics. They believe that they are possessed of a truth far more important than any scientific evidence, and their task is to defend it regardless of the evidence. And, honed by long experience, their debating skills are likely to be far better than any scientist who argues with them.

The fate of creation science

The immediate fate of creation science was decided in two courts in the United States, and in a confused political battle in Queensland. In 1981 the American states of Arkansas and Louisiana passed 'equal time' laws, as desired by creation scientists. The laws were at once challenged on constitutional grounds in both states. In Arkansas there was a set-piece court case, with local churches and scientists testifying that creation science were not science at all, but concealed religion. The United States has a strong constitutional ban on associating the state with religion so, if established, the objectors' claim would be lethal. And it was lethal. Judge William R. Overton heard all the evidence from both sides, and delivered a crisp verdict which pointed out that creationism was not

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science, was in fact disguised religion and so could not be taught in Arkansas state schools (Overton 1982,1984).

So clear was Judge Overton's ruling that the creationists chose not to appeal it. In Louisiana, however, matters went further. Judge Adrian Duplantier noted the Arkansas ruling, and also the similarity between the Arkansas and Louisiana rulings. As a result, he decided to save time and money, and struck down the Louisiana equal time law without a trial. The creationists did appeal this case right up to the United States Supreme Court. They lost every appeal, and finally lost in the Supreme Court itself (Lewin 1987).

In Queensland, and indeed in all of Australia, constitutional protection does not exist against the pushing of religious doctrines. There is a section – paragraph 116 – in the Australian constitution which resembles the American First Amendment (Parliament of Australia 2009), but it has little relevant case law to support it. Therefore, in the early 1980s matters were ominous in Queensland, with a fundamentalist Premier, a fundamentalist Leader of the Opposition and a fundamentalist Minister for Education[3]. And indeed, the latter convened a panel of science teachers – liberally weighted with fundamentalists – to decide how – not whether – creationism should be taught in Queensland state schools (Taylor 1995). A prominent creation scientist addressed the panel, but no scientists were permitted to do so, despite repeated requests. The non-fundamentalist members of the panel held firm, insisting that creationism could not be taught as science. At the same time, evidence emerged that the main creationist organisation had blundered away large amounts of money. While not being involved in dishonesty itself, the organisation had invested money which had disappeared overseas, and then for months had told their supporters nothing about the events (Bridgstock 1986: 84). When news of the losses became public the Minister for Education backed away from creation science. A couple of years later the state government was undermined and finally destroyed by a major corruption scandal, and the creationist threat receded.

Intelligent design – the next trojan horse

With these events the onrush of creation science was formally checked. However, the anguish of fundamentalists was not in the least eased. Given the vast pool of support for 'alternatives to evolution' it was inevitable that another attempt would be made to change the status of science, and it duly appeared in the form of the Intelligent Design (ID) movement.

On the face of it, Intelligent Design is far less of a threat to science than creationism. It makes no claims about the infallibility of the Bible, nor does it necessarily exclude evolution as an explanation for the development of life (Kitcher 2001). Noah's Flood and the Tower of Babel do not appear in its textbooks. Instead, there are a series of plausible arguments about the limitations of modern science. For example Michael Behe, perhaps the most prominent advocate of ID argues that we see in nature examples of 'irreducible complexity.' That is, structures and processes can be found in living creatures which cannot be explained by evolutionary processes. Therefore, Behe believes, there is clear evidence in nature of an Intelligent Designer whose existence must be acknowledged in science lessons (Behe 1996).

A range of other arguments supplement the basic ID thesis. The basic physical parameters of the universe, it is argued, are ideally calibrated to produce life. And many of us, not just the formally religious, are often struck by the view that the glory of the universe is so great that surely it cannot simply be the product of blind, simple physical laws.

As far as science teaching goes, the implications of ID would appear to be modest. Some sort of explicit door must be left open for the possibility that naturalist, materialistic science cannot explain all scientific phenomena, and that there is evidence of design to be found in nature for those who are prepared to look for it.

Compared to creation science, intelligent design has some unexpected properties. First, ID does not necessarily exclude evolution. Perhaps evolution did take place, though it probably cannot explain everything about life on our planet (Kitcher 2001:257). Second, ID is not explicitly Christian. The nature of the Designer is not specified in Intelligent Design. It follows that the designer might be the Christian God, the Muslim God, or some other entity which we cannot even imagine. It might even be a committee of Designers, perhaps of Hindu gods.

In view of these attributes, we might expect that ID would attract less fervent support from fundamentalists than creation science, but would also be less controversial in the scientific and educational communities. The first deduction would be correct, the second wrong. Intelligent design has not much appeal to fundamentalists, but it gave rise to a court case every bit as dramatic and confrontational as that in Arkansas.

The drama centred upon the little town of Dover in Pennsylvania. The elected school board of Dover had undergone gradual change, and a majority finally decided that some modification of teaching was required. They required science teachers to make statements about the uncertainty of evolution, and to distribute an Intelligent Design textbook, titled *Of Pandas and People* (Lebo 2008).

As with the Arkansas case, the actions of the Dover School Board were challenged in the courts, and the case was heard in 2005 before Judge John Jones III, a conservative Bush appointee.

The defence – arguing for the actions of the Dover School Board – faced profound problems from the start as many intelligent design supporters refused to appear in the court case. Michael Behe did appear. However, the plaintiffs' lawyers presented him with an immense pile of scientific books relating to matters which he had criticised – and Behe was forced to admit that he had not read them.

3. Joh Bjelke-Petersen, Keith Wright and Lin Powell respectively.

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Worse occurred when academic Barbara Forrest appeared for the plaintiffs. Forrest had co-authored a book on the Intelligent Design movement. In this book she analysed an ID document known as *The Wedge*, which spelled out in detail how Intelligent Design was quite explicitly a stratagem for introducing religion into schools through a scientific camouflage (Forrest and Gross 2004). There was even worse to follow. The plaintiffs had obtained from the publishers of *Of Pandas and People* documentation regarding the development and publication of the book. This made clear that the book was originally creationist in origin, and that a crude 'find and replace' process had been carried out, replacing 'creation' with 'design' all through.

Judge Jones, whom the defendants had expected to be sympathetic, was visibly angered at the tactics of the defence. When his judgment appeared it was devastating. In part he wrote that the required disclaimer:

> *. . . singles out the theory of evolution for special treatment, misrepresents its status in the scientific community, causes students to doubt its validity without scientific justification, presents students with a religious alternative masquerading as a scientific theory, directs them to consult a creationist text as though it were a science resource and instructs students to forgo scientific inquiry in the public school classroom and instead to seek out religious instruction elsewhere.*
>
> *(Jones 2006)*

Sadly, Judge Jones's life was threatened after his judgment, and he received special protection. It is of concern when matters which can be resolved in the courts involve threats of violence and death.

In the USA, therefore, both creation science and intelligent design have suffered massive defeats in the courts. Since the First Amendment is regarded as one of the keystones of American law, it is hard to see how such comprehensive defeats can be recovered. On the other hand, I have not the slightest doubt that the supporters of these pseudo-sciences will try. The anguish of fundamentalist Christians is absolutely genuine, and considerations of scientific accuracy and constitutional freedom count, in their minds, for little compared to the certainty of hellfire for themselves and their loved ones if this threat is not overcome. I predict that this struggle – a protracted political battle, really – will not cease for many years yet.

What does this mean for the person in the street? First, science will continue to be an incomprehensible activity 'way up in the clouds', inaccessible to most people. Scientists will continue to build their great edifice, knowing of their own work in detail, and less about the entire skyscraper. At street level, more and more enticing doors will appear, each assuring the casual visitor that they, and they alone, lead infallibly to objective scientific truth. And fundamentalists, and possibly other people too, will continue to construct alternatives to science, safe in the belief that they are doing God's work.

Should this bother practising scientists? I think that it should. There may be safety working within the walls of scientific organisations but the safety is not absolute. Funds can be cut, laws can be passed, and the progress of science brought to a halt. Other professionals are far more exposed. Teachers, especially science teachers, are especially vulnerable to political pressure, and it is here that the creationists and intelligent designers concentrate their efforts. It would be terrible to wake up one day and realise that although scientific research is in fine shape, our children are being taught a hotch-potch of religious doctrines masquerading as science.

Some conclusions

It should be clear by now that I regard pseudo-sciences like creation science and intelligent design as real threats to scientific practice. I do not think for a moment that the scientific community itself will be fooled by tendentious imitations of true science: research experts should be able to spot these fakes easily. The danger is that there is mass backing for anti-science practitioners, and this in turn can give them immense political power: science can be starved of money; strange 'alternatives' can be politically forced into the science classroom; politicians seeking support can often be persuaded to embrace popular alternatives regardless of their actual merit. And behind these manoeuvres is the ongoing anguish of those who believe they are saving their children from eternal hellfire.

What can we do? First, we should recognize that ignoring the issue will not make it go away: the pain of the fundamentalists, and those catering to their problems, is going to continue (Armstrong 2004). Second, the practice of real science should not be impeded by the existence of fallacious alternatives. Therefore, I do not favour all scientists becoming skilled in the art of refuting creationism: the fundamentalists constantly work variations on their own arguments, making this a full-time job.

I suggest two lines of defence. First, every scientist should be aware of the claims of these pseudo-sciences, and have some basic lines of defence ready. Know what they are likely to say, and be ready to outline your own reasons for disagreeing. In response to a creationist, it would be reasonable to ask an advocate whether it is correct that they believe that the universe came into existence in six days, where the water went that caused Noah's Flood, and similar points. This will not deter a professional creationist advocate, but it will confuse the workplace fundamentalists who are the foot soldiers of the movement. Second, there has to be some specialist defence as well. Since fundamentalists are not going to stop trying, it is necessary for the scientific community to defend itself. This probably means specialist centres, and also some individuals who are well-equipped to criticize outlandish claims from the standpoint of genuine scientific knowledge. If such people are excellent debaters, so much the better.

It might be objected that these measures divert resources – time and money – from the practice of real science. Indeed they do. But if the creationists or their kin ever gain real influence then the loss to science will be far greater. There have been cultures in the past – the Greeks and the Muslims, among others – who have supported scientific investigation and then turned from it. We do not want the same to happen to us.

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