

Professor Ronald Numbers delivered the lecture “Myths and Truths in Science and Religion: A historical perspective” on 11 May 2006 at the Howard Building, Downing College, Cambridge. The lecture was followed by questions from the audience and later a dinner/discussion at St Edmunds College.



Introduction by Denis Alexander: Today we welcome Professor Ronald Numbers who is the Hildale Professor of the History of Science and Medicine at the University of Wisconsin, Madison where he has been teaching for no less than three decades. He has written or edited more than a couple of dozen books, and we have a few of those on the bookstall, so you can browse later on. He is currently editing, along with David Lindberg, the eight-volume *Cambridge History of Science*.

Professor Numbers is also a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science, and a past President of both the History of Science Society and the American Society of Church History. I could spend a lot more time on his cv, which goes on much more than that of course and is very extensive, but I don't want to take any more of his valuable time. Instead I am going to hand straight over to Professor Numbers who is going to address us on the subject “Myths and Truths in Science and Religion in Historical Perspective”.

Professor Ron Numbers: Thank you very much. I am delighted to be here in Cambridge, especially with such wonderful weather. This hasn't arrived in the American mid-West yet so I am really revelling in it.

I was asked to speak on the topic of “Myths and Truths in Science and Religion”, it turns out because of some idle lunch conversation a few years ago when Denis heard me talking about my interest in this topic. Largely I was bemoaning the fact that after years, decades, of research by historians in the history of science and religion, the same old myths that we have corrected time and time again continue to have a life of their own and to be widely known among the public. One of the biggest obstacles, I think, to improving the public understanding of science and religion in the present is to clear up the myths that still linger from the past.

The secular public, to the extent that these people think about science and religion issues at all, knows for certain that organised religion has always opposed scientific progress, witness

Copernicus, Galileo, Darwin, Freud, John Thomas Scopes. They know that the rise of Christianity killed off ancient science, that the mediaeval Christian church suppressed the growth of natural philosophy, that mediaeval Christians taught that the world was flat, that the church prohibited autopsies and dissections during the Middle Ages and the Renaissance.

In contrast, the religious people know that science has taken the leading role in corroding faith through naturalism and anti-biblicism. If we want the public to take a fresh look at relationships between science and religion, I think we must disperse the hoary myths that continue to pass as historical truths. And here I should let you know that I am using “myths” in the good old-fashioned way that it was intended, as fiction or half-truth, not as in sophisticated anthropological or religious studies – so we’ll just get that settled right away.

Scholars have long debated how best to characterise the historical relationship between science and religion and no generalisation has been more seductive than that of conflict. Indeed the two most widely-read books in the history of science and Christianity bear the title “conflict” or “warfare”. The first of the books to appear, in one sense, was John William Draper’s book *The History of the Conflict between Religion and Science*. This appeared in the mid-1870s and was in fact less of a dispassionate history, which it wasn’t, than a screed against Roman Catholics and what they had done to inhibit scientific progress. Draper argued that the Vatican’s antipathy towards science had left its hands steeped in blood. Now it turns out that you wonder why would somebody – he was a very prominent chemist, founder and first President of the American Chemical Society, very active in the development of photography in the United States – spend so much time writing a whole book accusing the Catholics. Well, it turns out that he had a little boy who got sick and had a favourite book and Draper’s sister had become a nun in the Catholic Church. She was living with them at the time and before the little boy died she took away his favourite book because she didn’t think it was edifying enough. Shortly after the death, she left it at the boy’s place at the dinner table and Draper never forgave her for that. That seems to have been, in large part, the source of his animus against Catholicism.

Draper ignored or discounted the scientific contributions of many devout Catholics, from Copernicus and Galileo to Galvani and Pasteur. Only recently we have got a very good study of Catholicism and early modern science from John Heilbron, whose prize-winning study *The Sun in the Church: Cathedrals as Solar Observatories* argues that the Roman Catholic church gave more financial aid and social support to the study of astronomy for over six centuries, from the recovery of ancient learning during the late Middle Ages into the Enlightenment, than any other – and probably all other – institutions. What would we have done without the Catholic Church?

Now the reason the church initially became so interested in observatories was to establish the date for Easter, but eventually these observatories were used to study the geometry of the solar system and other general astronomical issues as well. Also, we now know that the Papal

medical school, San Viansa, now University of Rome, was for years, for decades, even centuries during the early modern period, pioneering work in anatomy and physiology.

Andrew Dixon White, an historian and the first president of Cornell University in New York State, wrote the second book, a monumental treatise on *A History of the Warfare of Science with Theology in Christendom*. He started lecturing on this topic in the late 1860s, published a little pamphlet even earlier than Draper, continued to write chapters through the years and finally, in 1896, came out with this two-volume *magnum opus*. He depicted the engagement between Christianity and science as a series of battles between narrow-minded, dogmatic theologians and truth-seeking men of science. It all began when he tried to get public moneys that Congress had given to the various states to fund the teaching of agricultural and the mechanical arts and White was determined at Cornell to set up an asylum for science, and not kowtow in the least to any of the religious interests. He proved successful in the competition against a number of heads of church institutions which made them somewhat critical of Andrew Dixon White, hence his interest in the perennial battle between science and religion. As he described this battle: "It was an age-old conflict, a war that lasted longer with battles fiercer, with cedures more persistent, with strategy more vigorous than any of the comparative petty warfares of Alexander or Caesar or Napoleon".

White believed some of the bloodiest battles had been fought between the sixteenth and seventeenth centuries in the period of the so-called scientific revolution, when powerful church leaders repeatedly tried to silence the pioneers of modern science. Copermicus, he said, who had dared to locate the sun at the centre of the planetary system, risked his very life to publish his heretical views and escaped persecution only by death. Many of his disciples met a less happy fate. Giodarno Bruno was burned alive as a monster of impiety; Galileo tortured and humiliated as the worst of unbelievers; Keppler hunted alike by Protestants and Catholics. Andreas Vesalius, the 16th century physician who laid the foundations of modern anatomy by insisting on careful first-hand dissection of the human body, paid for his temerity by being hunted to death. The latest victim in this protracted war on science, said White, was this institution, Cornell University, and its high handed President, Andrew Dixon White.

Despite numerous books and articles questioning White's interpretation, especially Jim Moore's elegant rebuttal published in the late 1970s, the metaphoric warfare remains popular, not only among the general public but within the scientific and religious communities alike. No scientist to my knowledge, or to the knowledge of friends of mine who work on the history of the scientific revolution, ever lost his life because of his scientific views, though the Italian Inquisition did incinerate the sixteenth-century Copernicun Giordano Bruno – but for his heretical views about the divinity or non-divinity of Christ, not because he believed in the infinity of the world or because he was a Copermicun. He argued that Christ had no human body and that his death on the cross was merely an illusion, which got some church authorities a little upset with him. He had other heretical notions as well.

In contrast to the frequently repeated stories about the torture and imprisonment of Galileo, we now know that he was apparently never physically tortured – he may have experienced a fair amount of mental anguish, but never physically tortured. He left Florence for Rome in 1633. When he arrived in Rome – this was for his trial – he stayed initially at the Tuscan Embassy, rather than in prison or at the offices of the Inquisition. The few days that he spent inside the Vatican during his trial were not passed in a cell but in a special three-room apartment made available for him as an honoured guest by one of the priests there with the Inquisition, and to make life as comfortable as possible they allowed him to get his meals prepared by the chef at the Italian Embassy and brought over to this “non-cell”. After his condemnation he was not incarcerated but placed under house arrest, first at the Villa Medici in Rome, then at the Palace of the Archbishop in Sienna where he stayed for quite a while, and then finally in his own villa outside of Florence. I don't think any one of us would love to be under house arrest for any period of time, although that was far from the fate that befell him according to so many popular studies of Galileo.

We also know from Andrew Dixon White and many others that during the Middle Ages the church taught that the earth was flat and we owe it to the brave, heroic Christopher Columbus for proving empirically by sailing to North America that the world was really round. Unfortunately, one of the people responsible for this notion was a very distinguished 19th century scholar here at Cambridge University, William Whewell, who popularised this view in his history of inductive sciences. But even a few years before Whewell, as the historian Geoffrey Russell has shown, an American writer named Washington Irving in a somewhat fictionalised biography of Columbus, talked about the earth being flat. So it wasn't until the 19th century that people began to think that oh, in the Middle Ages everybody had thought that the earth was flat. In fact, at least going back as far as Aristotle and through the 16th century, almost nobody thought that the earth was flat; it was almost universally depicted by educated people as a sphere and there are two people in the Middle Ages who argued for the non-sphericity of the earth; they, of course, were the ones that Whewell cited back in the first half of the 19th Century who continued to be the representatives of the evil thought going on down into the future.

In the early 19th century the psychologist Sigmund Freud noted that science had already inflicted three great outrages on humanity upon its naïve self-love. The first was associated with the 16th Century astronomer Nicholas Copernicus when it realised that our earth was not the centre of the universe, but only a tiny speck in the world's system of a magnitude hardly conceivable.

The second, according to Freud, was associated with Charles Darwin when biological research robbed man of his peculiar privilege of having been specially created and relegated him to a descendant from the animal world. Conceitedly, Freud went on to observe that man's craving for grandiosity is now suffering the third and most bitter blow, this time at the hands of psychoanalysts such as himself who were showing that humans behaved under the influence of unconscious urges. Now Freud need not have worried much about the mental suffering inflicted by

modern science. Copernicusism had indeed dislodged humans from the centre of the cosmos but that was a positive move. According to the accepted cosmology of the time, the centre of the universe was the worst place to be and if you read through the literature, which I haven't done much but colleagues of mine have done, you rarely find people complaining about being dislodged from this terrible centre of the universe. They had many other objections, perhaps – biblical, experiential as well, but concern about being dislodged, that's just another fiction that started to be circulated.

Psychoanalysis never achieved the prominence its founder dreamed of so never caused the trauma that he anticipated among most people. But what of Darwinism? What about its effects? How much emotional distress did the revelation of ancestral apes cause humans? Now here we have some very interesting statements, two of which I want to read to you now, about the impact.

The historian Peter J. Bowler has said "Darwinism's greatest triumph was that it soon established a complete break between science and religion". Interesting – but rather modest when compared to what the late Ernst Meyer said in one of his last books before his death, in *What Evolution Is*, he says, "No wonder the origin caused such turmoil. It almost single-handedly effected the secularisation of science." But this raises an interesting question: to what extent has science been implicated in something called secularisation? Now back in the 1960s and 70s, a lot of sociologists especially, and a few historians as well, talked about the history of secularisation and predicted that pretty soon the world was going to be entirely secular. One of the most distinguished anthropologists in America, Anthony Wallis, wrote in a text book in 1966 "The evolutionary future of religion is extinction based on extensive empirical research I'm sure. Belief in supernatural beings and supernatural forces that affect nature without obeying nature's laws will erode and become only an interesting historical memory". And in most of the theories of secularisation that were popularised after World War II, science played *the* key role in undermining religious beliefs. It's interesting today when you read sociologists, now they are trying to explain why religious belief is so robust around the world, and not just religious belief but fundamentalist religious belief, whether it's in India, or the Middle East, or North America that religion has proved to be so resilient and seems to be growing, and the most conservative and unacceptable versions of it at that. So we have a much different problem to explain than we did only a few decades earlier.

There have been some studies trying to assess the impact of science and particularly Darwinism on loss of belief in the 19th century and clearly a few people did give up their beliefs because of Darwinism, but Charles Darwin did not. Again, as Jim Moore showed years ago in one of the most moving essays I have read in the history of science, and honestly one that's moved me to tears, he tells the story of how Darwin lost his faith; first he loses his father, who is a wonderful physician, and according to Christian theology because his father wasn't a believer he was going to be burning forever in hell. How would a just God do something like that? Then his brother dies;

and then the ultimate blow to his religious beliefs was when his ten year old daughter Annie got sick. Mrs. Darwin was pregnant so Charles Darwin took her to a water cure that had benefited him, stayed up with her until she succumbed and died, and he was so broken up that he could not even attend the funeral. And Darwin thought if there is an omniscient God, an omnipotent God who could have saved Annie's life, why wouldn't he? So it was these very personal experiences that he went through, not the doctrine of natural selection, that prompted him to abandon Christianity.

A number of years ago, a British sociologist named Susan Budd studied the biographies of one hundred and fifty British secularists and free thinkers who lived between 1850 and 1950. Now one of the problems in studying secularisation is learning enough about individuals to tell what happened. But in the free-thinking literature, often their obituaries would contain the stories of how they lost their faith, which was a good thing to record. So she had a database rarely available to people trying to find answers to such questions. She discovered that only two of her subjects mentioned having read Darwin or Huxley before their loss of faith. Most of these people lost their faith for reasons very similar to those that had destroyed Darwin's faith in Christianity, for very personal reasons, wondering about the origin and nature of sin, of eternal punishment and questions such as that.

Not surprisingly many Christians and other religious people have taken offence at the negative and largely unwarranted characterisations that portrayed Christianity as the great enemy of scientific progress. They pointed out that Christian Europe gave birth to modern science and that a large majority of contributors to science were professing Christians. Some Christian apologists (and I'll leave them nameless right now) have gone so far as to reframe the historical relationship between science and Christianity as an essentially harmonious engagement, arguing that science could have developed only in a culture such as Christendom where belief in an orderly cosmos, created and regulated by a divine being, was widely held. And one doesn't have to go very far to find numerous statements of this thesis that not only were people like Draper and White wrong in their history, but that they were 180 degrees wrong that science would not exist today had it not been for the Christians and their theology that allowed science in the early modern period to grow.

Now I have to say that very few historians of science would go along with this explanation and one of the reasons is fairly obvious – in order to maintain this, one has to rule out all the accomplishments of the Greeks, and the Muslims, and Jews, during the period before the scientific revolution, or during the scientific revolution, and claim that whatever they were doing they weren't doing science. Andrew Cunningham, in the back row here, has had a marked influence on the historiography of science in recent decades by showing that science didn't in fact exist until the late 18th or 19th centuries. Before that we had natural philosophy, natural history and medicine: those were the people who investigated nature. Science as we know it, meaning the study of nature,

exclusively the study of the natural world, did not come until considerably later. So maybe it's a moot question about whether the Greeks or the Muslims were doing real science because it's anachronistic to speak that way, but they were doing a lot of the same sort of things that later Christian natural philosophers and natural historians were doing; although Christians, as I've already pointed out, often contributed and made crucial contributions to the growth of science in the 16th, 17th and later centuries, I think it's a conceit for Christians to argue that only Christianity could have produced science as we know it today.

As some of you know, I have worked probably far more than a person of sound judgement should have on the history of anti-evolutionists than creationists and I want to share with you a few of the myths that derive from this area of my research.

I'm not sure how popular the movie *Inherit the Wind* is in Britain but many of you have probably seen it on TV shows. It's a wonderful Oscar-winning movie portraying, using fictitious names, the great, infamous Scopes trial in Dayton, Tennessee in 1925. It's one of the best known historical events in the United States, in part because every high school and college textbook, most of which say no more than a few paragraphs about science in 500 pages, will have a paragraph or two about the Scopes trial; that's just standard fare. Over the years hundreds of thousands, if not millions of people, have seen either the play or the movie *Inherit the Wind*. This has taken on such a reputation as an accurate historical portrayal of what happened that a few years ago a federally-funded body of historians produced national standards for teaching US history and in the 1920s this group of eminent historians suggested that high school teachers should show this film so that they would understand the mindset of the fundamentalists who opposed evolution in the early 20th century.

Now that might be good if *Inherit the Wind* bore even a semblance to the historical event in Dayton in 1925. As you probably know, the anti-hero was William Jennings Bryan, a very popular American politician who had been a democratic nominee for the presidency on three separate occasions, and was one of the best-known and beloved politicians in America (not beloved enough to win the elections – but beloved in some circles). Contrary to what the film shows, and to what most Americans now believe, Bryan, who participated in the trial, was not a creationist in the sense that we now view creationists.

Since mid-century or so we have come more or less to identify creationists as people who believe in a young earth history with nothing happening more than 6 or 7 thousand, maybe 10 thousand years ago. And that's the way that Bryan is portrayed; he is insisting on a creation in 4004 BC on October 22, I think. One of the great exchanges in the movie is when Clarence Darrow, the famous agnostic attorney who was questioning Bryan on the stand, asked him if he could be exact and Bryan apparently said (the earth was created at) 9 o'clock; Darrow replies "That Eastern Standard Time or Rocky Mountain Time?" Of course, this always gets a big laugh. The transcript of the Scopes trial has been available since the end of 1925 in a cheap version so it was

readily available to any historian. If you look at the cross examination of Bryan by Darrow, the person who is surprised is Darrow. He thinks that Bryan should believe in a recent special creation and Bryan keeps telling him no, no we don't and at one time, in exasperation, he says "We don't care if the creation week was six thousand years, six hundred thousand years or six hundred million years, this is of no consequence". And he was right. Fundamentalists who opposed evolution in the 1920s – at least those who wrote and expressed themselves on the subject – almost all accepted the evidence of historical geology regarding the antiquity of life on earth. It wasn't until this young earth creationist movement of the 1960s took over that most creationists – I can't swear to that but it looks like most creationists – embrace this notion of a recent special creation. Bryan had been invited to Dayton by the head of the World's Christian Fundamentalists' Association, a Baptist preacher named William B. Riley. Riley went around the country preaching the very same message that Bryan was giving on the stand that the days of Genesis, obviously, symbolised great geological periods and there was no trouble for fundamentalist Christians accepting that. Where they drew the line – Riley, Bryan and other fundamentalist leaders, was with human evolution and largely because of the moral implications. After all, tell young people that they descended from animals and they couldn't be too surprised when they behaved like animals; and God knows in the 1920s American youth were behaving a lot like animals. (But only in the 1920s!)

I can't resist drawing another aside at this moment about creationists and their views, because I keep hearing about this at least once a week and reading about it at least every other week. There's a strange notion abroad that creationists defend the idea that God created every species. Now they may have at one time, but you'd be hard pressed to find any creationist defending that in the last fifty years. I read in here colleagues in the biological sciences say boy if I could only talk to some of these people and show them what we have discovered in the field or in the laboratory that shows the development of even a new species, that would certainly convince them to give up their beliefs. The problem is they don't *believe* that. They abandoned that at least a half a century ago and for a very good reason. As more and more fundamentalists and creationists accepted the young earth view of creation, they had to find a way to account for the tremendous geological record and universally the young earth creationists turned to Noah's flood, that lasted about a year, so they take the entire geological column and compress it into about a year of earth history.

Now Noah's flood occurred about 4,350 years ago plus or minus a couple. Unfortunately, the Bible gives the dimensions of Noah's Ark so you can determine its maximum capacity and even if you make all the animals go into hibernation so you don't have to store food on the Ark, you can't get representatives of the millions of species that over-active zoologists have created. So since about the late 40s and early 50s, creationists have tended to focus more and more on the Bible which says God created kinds, not species. And what is a kind? A kind is what God created in

Eden, number one, and what God saved on Noah's Ark, number two. So you don't have to have that many representatives but what you have to have is an incredible amount of speciation since Noah's flood, because you probably only have one pair of canines on the Ark and in 4,300 and some years and only 4,300 and some years, you have to have that canine pair producing all the foxes, coyotes, wolves, and domestic dogs that we have around us. Young earth creationists have to have evolution on fast forward. There is no zoologist in the world who is not a creationist who would have evolution acting that fast. They call that microevolution – anything that occurs within an originally created time or time preserved on the Ark is microevolution as opposed to macroevolution. So there is no evidence whatsoever that zoologists are going to find relatively small changes in the organic world that will convince a young earth creationist to give up his or her views. I know it's sad new but I have to share it!

Finally, I want to say a few words about the globalisation of the creation movement. While he was alive, the American palaeontologist Stephen Jay Gould travelled around the world on numerous occasions and was frequently asked about this American phenomenon known as creationism. When Gould, right up until the time of his death, would assure these foreign audiences that they had nothing to worry about because this was a unique American bizarrrity (his term for it) and there was not a chance in the world that this would ever spread out of the United States. Unfortunately it has; I'm a historian and I should not be judgmental in what I say about this, it has spread outside the United States.

Let me just give you a few of the more interesting examples here; some of you may know that Australia, especially in the Pacific, has become one of the powerhouses in the anti-evolution movement since about 1980 and one of the founders of the Australian movement settled a number of years ago in the United States near Cincinnati, Ohio and has created a huge empire there and is just about to open a 25 million dollar creationist museum. His name is Ken Ham – some of you may have heard him when he toured Great Britain in 2004 and from what I have heard, attracted some significant audiences here. South Korea has an amazingly active and large creationist movement and in the last few years they have begun sending creationist missionaries to other countries, including to the west coast of North America, and to Indonesia I think, as well.

One of the most surprising areas to receive creationism warmly has been Russia. With the fall of the Soviet Union, Russian officials in the Ministry of Education began contacting American creationists inviting them to write textbooks and to come over and give them advice on how to teach creationism in Russian schools and they had a very interesting historical justification for doing this. They had lived through the days when Lisenkoism was imposed on Russian biology and now they wanted academic freedom and not just neoDarwinism being taught to Russian young people, and so they invited the fox into the henhouse.

In just the last three or four years, we have had the ministers of education in The Netherlands, in Italy, in two countries in Eastern Europe, excluding Russia, advocate the teaching

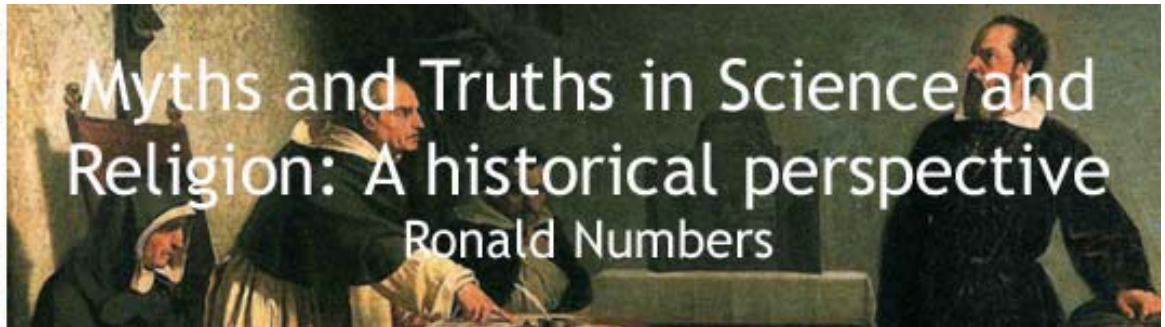
of creationism or Intelligent Design. The Minister of Education in the Netherlands a year or two ago came out in favour of teaching intelligent design because, as she said, it was one view that could bring Christians, Muslims and Jews all together.

Certainly, one would not expect this American bizarrry to have spread to non-Christian cultures. But again, one of the most active and successful anti-evolution movements in the world today is now centred in Istanbul, Turkey. It's called the Science Research Institute, or BAV: I have no idea what that stands for, but sometimes that's how it is referred to in Turkey, and it's headed by the charismatic religious scientific fellow named Harun Yahya; his real name was Adnan Oktar but he has taken the pen name of Harun Yahya. He has been active since about 1990. He was trained first as an interior designer and then studied philosophy but was never allowed to graduate from the university that he was attending, but is clearly a very bright and charismatic individual and he has decided unlike most people, he claims, in the Muslim world to try to harmonise Islamic teachings, the teachings of the Koran, with modern science. Most of his peers, he says, just don't pay any attention to modern science but he at least wants to integrate it and at least show how they should interact. He has written over a hundred books and in the early ones he would frequently deny the Holocaust. More recently, especially since the aeroplane crashes of 9/11, he has made a distinction between opposing Zionism and opposing Israel, so that he's an anti-Zionist and not an anti-Semite now. He has written a number of books opposing evolution which he thinks is an atheistic, materialistic point of view. His books, the most popular one *The Evolution Deceit*, has been translated into any number of languages and distributed round the world in millions, millions of copies of *The Evolution Deceit* are now circulating. For a while the Discovery Institute, the home of the intelligent design movement, has listed on its website Harun Yahya's website as the Islamic intelligent design website, even after Harun Yahya denounced intelligent design on his website because it doesn't acknowledge the work of Allah.

Now, certainly the United Kingdom will be spared from this American bizarrry because there aren't enough good Christians here to succumb to the wiles of creationism and certainly that seemed to have been the notion until recently but as many of you know even better than I do, there has been a fair amount of activity in recent years in the Creationist camp. John Polkinghorne, I know, and Colin Russell and others have been opposing this threat, but I was most surprised to see the results published in *The Guardian* not long ago of a poll surveying the British people. Now some of you may know that polls in the United States, depending on which ones, about 50-some% of Americans believe that the first humans were created no more than 10,000 years ago (that's been going up in recent years), two-thirds of Americans believe that creationism should be taught in the public schools, there are only about 10% of Americans who would not identify themselves as theist in one way or another. But what about in the United Kingdom? Well, this survey, published in *The Guardian*, which some of you may have seen – I don't know how many of you read *The Guardian*, but fortunately it's available on the web to people in America – showed that a minority of

British people believed in regular evolution, 21% as I recall believed in theistic evolution, and 20% of the British people said that they were creationists, which seems a lot higher than any estimate I have heard, even from talking to the creationists in the United Kingdom in recent years.

To somebody like me it seems that every day the United Kingdom is becoming more and more like the United States. Thank you.



Overview

Professor Ronald Numbers delivered the lecture "Myths and Truths in Science and Religion: A historical perspective" on 11 May 2006 at the Howard Building, Downing College, Cambridge. A transcript of the lecture can be downloaded from:

<http://www.st-edmunds.cam.ac.uk/faraday/CIS/Numbers/>

The lecture was followed by questions from the audience and later a dinner/discussion at St Edmunds College. A transcript of the discussion follows. It was chaired by Dr Denis Alexander (Babraham Institute) with introductory remarks by Prof. Brian Heap, Research Associate, Capability and Sustainability Centre, St Edmund's College, Cambridge. The other contributors are described at the end of the discussion

Templeton Foundation Post-dinner Discussion

Ronald Numbers - 11th May 2006

Denis Alexander: Colin Russell is going to start with a few comments and a response to the lecture, then we're going to have a number of people joining in, and finally we'll give Ron a chance to come back and respond. We don't like this to be a dialogue between the lecturer and everyone else around the table; we prefer to have a round-table discussion in which the lecturer is intimately involved, so that's the way it works.

Brian Heap: This means that you are quoted all round the world at this discussion meeting when Google picks out the relevant name.

Ron Numbers: Everybody calls me Ron – only my mother when she was here called me Ronald!

Colin Russell: Denis, thank you. I just wanted to start by thanking Ron very much for his very informative and stimulating talk and for saying a number of things that I completely disagree with and a number of things more that I completely agree with. Will you promise you won't sue me for anything I say now?

Ron Numbers: You know, it's OK to believe in myths!

Colin Russell: The myths we were looking at are very interesting ones. I was reminded of one myth that I'm sure everyone has heard of, which is that when the process of anaesthesia by chloroform was discovered and used in midwifery cases in the nineteenth century, the guy who discovered it, James Simpson, was attacked by the church and he was pilloried in sermons and discussions because he had done something that was going to eliminate the curse that Genesis gave to women to have labour in childbirth.

I had a research student who looked at this as part of a bigger task and, to cut a long story short, he found that all the stories to this effect, which are in all the modern textbooks

on the history of medicine, are actually almost baseless; but not quite, because he traced them down in a sort of family tree to just one source, and that one source was A.D. White. There is a statement in A.D. White's book that this clerical opposition was in fact the case and he doesn't even give a footnote reference to it. And this has spread and exploded from that statement, so it's an interesting illustration of what Ron was saying. Now I would like to suggest three things which seem to me to be quite relevant to look at and discuss, if you want to.

One is about this business of myth-making and Draper and White. Now clearly they were men who had chips on their shoulders and they had lots of axes to grind. The question I would ask is this: what about us, the way we do history. Do we have axes to grind? Do we have chips on our shoulders? And if that's a possibility, how do we avoid it? It seems to me to be a question that can follow from the things that we have already heard.

Then we have also heard about creationism in great detail – many of us might think too much detail – and how it has been spread, and a little bit about the mechanism. We haven't talked about the opposite side of things because there clearly wasn't time, namely spreading what I would call "conflictism", the notion that science and religion are in conflict. Now how did that spread, and why? Was it just a natural thing? That seems to me to be an issue that one or two of us have looked at in the past which could certainly take a lot more looking at.

And lastly, something about creationism which gives it a whole new modern fillip and tips it into a scale of much greater relevance, concerning an issue that was raised in the American Journal *Science* about six weeks ago: how far in North America is creationism linked with the anti-environment movement? How far, in other words, have the anti-evolutionists and the anti-environmentalists made common cause of this very reason because *if* there is a connection – and I personally think there is – it's in the interests of every person in this room and on this planet to find out what it is.

Those are just some things that I would throw out. You may have other far more intelligent and important things to talk about but I would like to kick off with those.

Denis Alexander: Before we open up the discussion, perhaps there are others who would like to chip in on one or more of those themes.

Brian Heap: Could we just ask Colin to enlarge on that final cryptic comment about the link between the anti-environmental cause and creationism?

Colin Russell: We talk about the far right – the far right in America does not mean the same as it does here.

Brian Heap: But why are you raising it? Are you raising it because the anti-environmental lobby is saying that God is in control, everything will work out, why should we be concerned with environmental issues? Reading Revelation 21 is about creating the new earth, that there will be a new creation and everything will be resolved. Are you saying that this anti-environmental lobby is identifying with that particular perspective and therefore there is no need to worry about global warming because this is all going to be resolved?

Colin Russell: That's part of the point, but also they would go further and take the curse in Genesis as meaning the earth is cursed anyway, so there's not a whole lot we can do about it. The connection is the sort of connection that you get between the Puritans and scientists in the seventeenth century, a connection of identical people but also an isomorphism of their ideas, they have a similar shape. This is something that some people are now getting quite concerned about because it seems that the anti-environmental group in America is moving a little bit backwards, on the retreat, on the back foot, and I don't see the creationist movement doing that. Who knows? It's a connection that I think is worth looking at.

Denis Alexander: Ron, do you want to reflect on environmentalism and creationism links?

Ron Numbers: I don't get to reflect on all of them, just on that one?! I want to reflect on all of them but I will start with this one because I think that's a really important issue. I don't find the anti-evolutionist, that is the creationist, saying too much about the environment. To a great extent they ignore it – a large percentage of them would be premillennialists

Denis Alexander: I don't think anyone around this table would even know what a premillennialist is!

Ron Numbers: This would be somebody who, on the basis of biblical prophecy, believes that the world will probably end in our lifetime. Many fundamentalists and pentecostals are premillennialists; back in the Reagan administration we had a Secretary of the Interior who was responsible for our national parks and forests who was a premillennialist. Not surprisingly, he didn't worry too much about this because he was sure that the world was going to end within just a few years. So I think that when one is a premillennialist there is a tendency not to focus on environmental issues, but to focus on saving souls to be ready for the second coming of Christ. So I think they've been rather silent. Occasionally you'll find surprises. The founder of the Creation Research Society had a PhD in Genetics from the University of California Berkeley, which undoubtedly saved him from some mistakes and he was an active environmentalist, a member of the Sierra Club. I am referring to Walter Lammerts – some of you may know him – who was a Kennedy Democrat and who just did not fit the stereotypical model of your creationist at all. So you do find some voices. There is a study just about to come out by Jim Procter, who is the recipient in the United States of one of probably the largest grants from the Templeton Foundation. He has been working on Christians and environmentalism and so we are going to learn a lot more about the degree to which evangelical and other types of Christians have supported or opposed environmentalism when his study comes out. I guess my take on that is that most of the creationists don't get involved in it but when you move over to organisations like the American Scientific Affiliation, which is an evangelical thing, then you start finding concerns about the environment because they don't believe in what's going on.

Denis Alexander: Shall we keep on this theme of creationism and environmentalism just for a minute. Does anyone else want to chip in on that issue?

Jason Rampelt: I don't think Colin is that far off in his feeling that there's a connection between creationists and anti-environmentalists. I think there is a perception among – I don't know if it's creationists *per se* but maybe we should just broaden it to fundamentalists who are an overlapping domain with creationists, a perception that environmentalists are just a bunch of tree huggers and it's basically Boniface against the Druids all over again. I think for those people there is this tension: are you going to worship God or worship the creation? That's a very real feeling. I think you've picked up on something there, though I don't think that represents everyone or even a majority.

Brian Stanley: If there is a theological connection between the two I think it probably lies in the fact that the anti-evolutionary lobby puts so much emphasis on the total replacement of the created order by the new heavens and the new earth that there is really no continuity whatsoever between the present created order and the new created order, and so therefore we need not worry about the stewardship of the present created order. They're very much into a God who works in discontinuities rather than by process; therefore that might link in with their opposition to evolution. **[Brian Heap: Dispensationalism?]** Yes, it's a form of dispensationalism.

Ron Numbers: We have an evangelical at the University of Wisconsin, Calvin de Wit, who was featured in *Science* magazine recently for having brought together a bunch of religious leaders who were pro-environmentalism. As an evangelical he is connected with the American Scientific Affiliation and other evangelical groups to try to get more evangelicals to speak out on this issue in a positive way.

Brian Heap: A report in *Nature* 400, 136, 2006, reported that American evangelicals have listened to Sir John Houghton, who was the Co-Chair of Intergovernmental Panel on Climate Change (IPCC). Richard Csizik, deputy leader of the evangelicals, said that he had a conversion experience when he heard Sir John speak about the environment and about 80 evangelical leaders signed up to the view that global warming demands attention at the highest level. Subsequently, deep divisions have come to light within the movement based on the argument that this is a political issue which is not pertinent to the main task, which is evangelism. Therefore the global warming issue is still off limits to a number of leading evangelicals. The unwillingness to weight the evidence about global warming leads to my question about whether creationists and 'young earth' believers look at the scientific evidence?

Ron Numbers: *The scientific evidence.* I think not. I think the young earth people, when they look at science, scrutinise it to find a contradiction, a problem, a flaw of some kind so in their sense, yes, they look at it but not for enlightenment. I think they are very sceptical of what many scientists in this area are saying. Mostly, in terms of physics, biology, chemistry and other areas, they are quite fine with that and it doesn't seem to be an issue. If there's a fundamentalist institution in California that awards accredited PhDs in biochemistry, biostatistics and other areas. They are apparently not tainted in any way – well, they may be – but they get jobs; so I think that being a creationist necessarily keeps one from being active in various scientific areas.

Bob White: On that specific issue, I get a lot of mail from young earth creationists because I'm a geologist, and I think it's fair to say that they are striving in their minds to do science. There's a big programme called RATE run by the Institute of Creation Research which almost every young earth creationist points out to me. They say "we've got real scientists doing real research projects finding inconsistent dates, so you can't believe anything to do with radiometric dating". I have looked into RATE in some detail, and it turns out that they have not been able to publish a single paper in the scientific literature. So whatever else this programme may be, it is not scientific in the sense of being open to the normal scientific process of peer review and verification by other scientists.

I think the problem is that the young earth creationists don't realise, or perhaps they do realise but cynically use the fact, that a lot of science is very uncertain. There are big ideas that work powerfully but there are always bits that don't quite fit. If that wasn't the case, scientists would soon be out of a job! This is particularly true of radiometric dating because some dates are insecure; they're not good, and there are ways of telling that by looking for internal consistency. I have to say that young earth creationists generally purposely find the dates that don't fit and ignore the internal consistencies and so then say "Look, this date doesn't work, so you can't believe any radiometric date whatsoever". So I think there is a measure of purposeful direction, or rather misdirection, in the way they use scientific results. [**Brian Heap:** deceit?] Well, yes – but I am being careful in the words I use.

Brian Heap: I think it would be useful if the correct word is used because the error can't be that great when you're comparing something that has to do with billions of years compared with thousands of years; it's a huge error but the error in geological dating is nothing like that, surely.

Bob White: Yes, you're absolutely correct. But say you get a piece of rock out of Mount St. Helen's – this is one of the young earth creationists' golden pieces of evidence now – and we know that Mount St Helen's erupted in 1980, but the radiometric age of the rock comes out as far older. Therefore the young earth creationists say you can't believe any radiometric dates. But there's a very simple geological explanation for this apparent anomaly, which is that when you erupt new rocks from a volcano and they blow out explosively, they pick up bits of older rock on the way. So it's not a difficult observation to explain, and yet that

apparent anomaly is going round young earth creationist circles as evidence that radiometric dating doesn't work and if they are not scientists, they believe what they read.

Brian Heap: But some of them are scientists.

Ron Numbers: Yes, and I think most of them are sincere. For example, when it comes to dating, take Carbon-14 dating – and this will probably apply to almost any dating scheme – they argue that it's based on an assumption of uniform production of Carbon-14. But if, at the time of the flood, the vapour canopy that allegedly surrounded the earth had screened out cosmic radiation, then you have a huge discontinuity and they believe that, they really do believe that. So they say "Yes, Carbon-14 works if you assume uniformity, but that's an assumption and it's an unwarranted assumption". I don't think they are being deceptive in any conscious way. I think they're dead wrong but I think they have convinced themselves that they're right, this is an assumption. Uniformity in this area and in many dating techniques is an assumption that practitioners are making. They don't buy that, so in that sense I would say they're not insincere.

Bob White: Well, just to go down this line I think sometimes they are deceitful. There's a man in Australia called Andrew Snelling and there have been a number of reports mentioning him. He is a geologist working in the mining industry on rocks which are over a thousand million years old. You can read his published scientific papers – in them he describes the age of the rocks as being one thousand four hundred million years. But he's a young earth creationist and he also publishes a lot of papers in the creationist literature where he talks about the earth actually being only ten thousand years old. So somebody tackled him about this. He said that if he didn't put one thousand, four hundred million years in his scientific papers he wouldn't get them published, so he did it just to get them published because there's a big conspiracy out there against young-earthers; but actually he doesn't believe it.

Ron Numbers: OK, and I'll mention a creationist geologist named Stephen Austin. When he was in graduate school at Penn State he used his real name for his dissertation; then when he was publishing in creationist journals he used a pseudonym (Stuart Nevins) so that nobody would find out. In one sense this might be considered deceptive but he figured he would never get his PhD otherwise and he played this sort of game, so occasionally you'll find people doing this.

Snelling is an interesting character. I just tried to get some information out of him a couple of weeks ago and he was as snippy as anyone I've ever tried to get information from, so I'm not happy with him. You're absolutely right that in his scientific publications he'll use the conventional dates because he knows he has to in order to get the consultancies that he uses to make money. In his creationist materials he uses what he really believes.

Denis Alexander: Now there is life beyond creationism, fortunately, and I'm wondering if there are some other themes that we might move on to that are a little different.

Jim Moore: There's a self-congratulatory aspect to this discussion so far. 'We're not one of them', 'it doesn't happen here' or 'it won't happen here', 'it can't happen here'. But we all know that there's no 'establishment clause' as in the US constitution, indeed there's no written constitution here to prevent creationism being taught as science in schools, particularly in schools which can escape the constraints of the National Curriculum *i.e.* Trust schools and City Academies. Is there anything that ought to be done about this? This is about politics and it seems to me to be an urgent question.

Ron Numbers: The retiring president of the Royal Society had a very strong statement on this issue.

Brian Heap: The Royal Society has issued a statement which is predictable and addresses this issue in terms of the extent to which it should or should not become part of the curriculum. Of course the Royal Society would say it should not become part of the curriculum in terms of formal science teaching, so it's quite clear on that position.

Jim Moore: When you get creationism covered in a Religious Education class of fifteen-year olds at the Perse (a private school in Cambridge), the biology teacher won't have to cover it because she's under pressure from Muslim students who say "Why aren't you telling us about creation?" This is at the Perse.

Brian Heap: Well, I would expect it to be so at the Perse.

Jim Moore: But good on them for teaching about creationism in RE.

Brian Heap: Perhaps within the context of a religious education these issues should be examined, provided they do not get mixed with the scientific curriculum.

Jim Moore: This sounds like "teach the controversy," which is exactly what creationists and Intelligent Design people want. They say that we want you to get our data out in front of students in the name of giving them all the scientific evidence. There is a problem with that, in America and at the Perse, but I suppose it's taught that way up in Gateshead. There are other people who might know more about this.

Denis Alexander: I would quite like to move the conversation back a little more to mythologies between science, religion and the history sciences because I think that's been the main focus of Ron's lecture, though this is an interesting discussion.

Ron Numbers: Can I start with Simpson? I think Simpson is one of the great stories of science and religion, and I should have mentioned him properly. James Young Simpson, who used chloroform for childbirth – after the Americans had discovered anaesthesia for surgery (laughter!) – then heard that a cleric in another city was writing a diatribe against him on religious grounds. Now it turned out that this critic never published his diatribe but Simpson went ahead and published his reply, which a lot of historians have read, and which makes it seem as though he was attacked by a lot of people. I know two historians who have looked at this, and say that there was actually very little religious criticism. He was anticipating the arguments of a religious critic that never appeared in print – it's kind of a "tempest in a teapot" sort of thing.

Colin Russell: The idea that he was criticised in print or in Synod was refuted by this research student of mine who went through all the Synod meetings, all the theological press, everything you could think of and there wasn't a single mention.

Ron Numbers: But he was sure because he was told that someone was going to attack him on religious grounds.

Colin Russell: But the reply that he wrote was a bit tongue in cheek, and said "Well, after all, anaesthesia was virtually what happened in Genesis when Adam was put into a deep sleep".

Denis Alexander: We have thought in the lecture about a lot of different mythologies in the history of science and religion, but are there any other favourite mythologies that people have, or that they think may not be mythology, that they would like to bring into the discussion? I am sure Ron can mention lots more, so are there any others that occur to you?

Andrew Cunningham: Yes, I would really like to come back to this question of the two great books about the conflict between science and religion. Recently I read Andrew Dixon White's two volumes, every word in both volumes, and then I realised that the two volumes were his autobiography already, that his life was one of coming to terms with antislavery at a critical time of his own life. You cannot find the church on the right side, I suppose one might say he becomes very cynical about the church and when he's trying to found a university without any religious texts in it he becomes very hostile indeed and he writes his great book. These two books are the source in my view – and I should say that my view is not a very common view – yet [**Ron Numbers:** It's becoming more common!] but is that the whole dispute is a nineteenth century thing and largely created by these two guys. I was

astonished to realise that White effectively created Cornell University and gets Cornell, who is a much richer guy, to put his money there and have the university named after him.

Under some hats I'm a historian of anatomy. One thing I now realise I have to say to every audience, wherever I talk on the history of anatomy, is that – and I should start by saying it – I am possibly the only card-carrying atheist at the table [**Brian Heap:** Don't be too sure about that!]. [**Ron Numbers:** Can you pass the card around?] I have to say the Catholic church was never against anatomising and I say never, ever, anywhere, and in fact you can look at the Catholic church .. especially cardinals who become popes, as positive promoters of anatomical knowledge. Why do we think that it seems a natural thing that they were opposed? And the answer is because of Draper and White. If you look at what White says about the history of anatomy, every part of it is a lie. The man is president of a University, Cornell University, he's a very distinguished academic, he's gone to Europe and got the very best of Europe and taken it back to America. And this is my real problem, I really like the guy but his book is full of lies.

Ron Numbers: But don't you think he's sincere?

Andrew Cunningham: No – because these lies are ones seen through certain glasses and what the two of them create are a whole series of myths which you were dealing with today. These myths are myths in the real sense that they are not true. They are also myths in the real sense that they do work and this work has now been done for one hundred and thirty or forty years. Between them these two books by eminent American academics create the whole atmosphere of the conflict between religion and science. Personally I don't think there ever was a conflict until we have science in the nineteenth century and we have people who in their individual lives, as you were pointing out today, something as close as your sister, something as close as I think it was White's mother or something, they set up the situation whereby these people are totally against organised religion in the area where they live.

Now I would like therefore to extend a question that Colin asked. He said how did conflictism spread and I want to raise the question, how did the conflict thesis start? Obviously you can go down to White and Draper and say it starts very individually in their lives, but it's also very much a reflection of certain battles going on in the 1870s, 1880s and 1890s in America and indeed in ..

Ron Numbers: There's a very good essay on that, written by Jim Moore.

Andrew Cunningham: I'll get to read that after I have asked the question! How did it start and why did it start? This question of the myths that White and Draper told, every one of them is wrong, every one was a lie in favour of science and against religion. Myths do work. I want to ask about that kind of work, and what you have to say about it.

Ron Numbers: I agree with you fully. I've got to say something since Jim's the author of what I consider to be the best history of this, but one of the things we don't know that much about – and Colin's written on this too, of course – is how people responded. Now we know that Draper and White sold tons of books. I've done a little bit of work on responses, and these two volumes drove a lot of Christians up the wall; there was a huge negative response. We still don't have a single historical article on the subject. At least two people have started writing about this and then abandoned the project. You don't have to go very deep into the religious literature of the nineteenth century to see negative reviews, people who say "Oh no, this is just going to be another battle in the warfare of science and religion, let's avoid this, this is a terrible thing for Christianity". That part of the story hasn't been told, but the origins of the debate, the cultural context, I think has been told beautifully.

Jim Moore: It's more complicated than I would have thought but I'll try to make it simple. There must have been soil in which those books took root; those books didn't produce something all by themselves. We talked about this yesterday, about 'vulgarity', and I'll be vulgar again tonight. There's a long history of organised and disorganised and illiterate and unwashed free thought, from Richard Simon to the Encyclopaedists, to Tom Paine and

Victorian secularism. Anti-clericalism – another name for it – got a huge fillip through the French Revolution, 1848 and all that. Across Europe, including Britain, secular societies were founded and eminent people joined – the likes of Michael Foot, think about it. Most of the people most of the time in this period were illiterate; the self-improvers who could read educated themselves in places such as Mechanics' Institutes and pubs where they could get scurrilous and disruptive literature. Draper and White's books fell into a world where a very large number of people were *already* alienated in an anti-clerical way from state churches and from *de facto* established churches, such as in parts of the United States, especially the South.

Draper came from Merseyside, which was full of Catholics, and he was a Methodist, a Protestant, and this was very personal to him as Ron would say. When he went to New York City and became Professor of Chemistry at what, I think, is now NYU he became an ally of Samuel Finley Breese Morse of the Morse code, who was a flaming nativist; that is, he was of a political persuasion that believed in Catholic conspiracies and in Catholic immigrants undermining American democracy. It's entirely possible for a guy who wrote a book on human physiology and was effectively a materialist – who also wrote a history of the American Civil War and was a patriot – to be anti-Catholic and religious at the same time. Draper's book started in the late 1830s 'Streets of New York' while he worked on photo-micrography and took the first known photograph of the moon.

So I want to say that there is a whole history of organised and disorganised free thought that needs to be brought into this equation. Draper and White unwittingly, because one was a Methodist and one was an Anglican ... [**Ron Numbers:** We call them Episcopalians!] neither of them intended to undermine what they regarded as true religion. White himself believed it was a terrible false idea that religion and science could ever be in conflict. There's the intention, there's the context and the prepared environment. Remember America wasn't as religious per cubic inch as it now is; there was a great deal less control on the frontier. 'Revivals' were needed to keep stability in places like Dodge City, Kansas or in the mountains during the Gold Rush. And there were lots of uneducated free-thinkers prepared to latch on to anything that would help them attack their enemy, which they saw as organised religion. It was more complicated than that, but Draper and White's books have certainly become controversial. Do you think it's a myth that those books caused a conflict?

Ron Numbers: He says they did.

Bob White: The conflict is a myth, the book's a reality

Andrew Cunningham: I think it's a myth that there was a conflict before the 19th century but in the 19th century, and I have strange weird views about this, these are the two books which characterise it in such extreme terms and promote so many myths that Ron was trying, and succeeded, to call to our attention and saying these are merely myths.

My argument is these myths work and I think you are helping there in why these myths worked in terms of there were audiences to receive them – but we are not that audience and yet we still take up these myths. As far as I can see we start the whole of this issue – it's my first contact with this – the whole of this thing is built on the myths of these two guys.

Ron Numbers: Let me just say something that people around the table might not know about. Andrew Cunningham has been a leader in the history of science community in arguing, and I think rightly and convincingly, that science did not exist before the late 18th/early 19th century. Hence you never see a title, *never* see a title, on science and religion before the 1820s. The first one I have ever found – and you've (Jim Moore) looked through this too – was about 1820. Then in the 1830s you see a few more, because natural philosophy, which was one of the dominant terms for investigating nature and which assumed that you were going to discover information about God. So you can't say that there would be a book about natural philosophy and religion as it's almost an oxymoron; people

don't write about that. It's when science becomes identified narrowly with natural knowledge of nature that people start writing science and religion. Jim's tracked this through the Library of Congress.

Jim Moore: Which doesn't eliminate the point that there was a massive anti-clerical movement across Europe, particularly in places with state churches and where political and religious freedom went hand in hand. Political oppression was escaped by attacking its religious foundations, by pitting reason against faith, or nature against scripture. It wasn't yet science versus religion because science with a capital "S" barely existed in 1830. Andy's absolutely right, but this doesn't negate what I was saying.

Denis Alexander: Perhaps others might like to break in at this point.

Brian Stanley: Just on that last point, it's partly to do with the professionalisation of science and the competition between scientists as a new self-conscious, self-aware profession and the clergy; so it was a competition, particularly in the universities, for intellectual leadership. What I was really going to say is whether we can move the question on a little bit, not why did a conflict start but why hasn't it stopped in public perception? Ron picked this up in his lecture and referred to the fact that it's nearly 30 years since Jim wrote his book on the post-Darwinian controversies. The media presentation of the issues, as far as I can see, hasn't changed at all. I find this deeply depressing, as somebody who writes history books, and the world doesn't seem to take any notice.

Jim Moore: You're talking about Melvin Bragg, Andy Marr, people like that.

Brian Heap: And Richard Dawkins.

Jim Moore: If they discussed contemporary politics like they treat science and religion, they would be out of a job.

Brian Heap: It's because you guys don't teach in universities that there is a change. As a result you get people like Dawkins. In fact I was reflecting on your point about myths being useful and "The Selfish Gene" has been a very useful myth because it's actually started to get people to think about genetics in a totally different way. It probably is a myth, it's probably going to be shown to be completely wrong and I think the evidence for this is coming from the debate that's now moving into the area of adultery?, where the selfish gene becomes an oxymoron. As you say, it's ridiculous. So I think this question of sustaining the conflict hypothesis is probably due to the way in which the science and religion interface is taught in our universities by you guys.

Colin Russell: Well, I'm not trying to escape your judgment but I have spoken to more BBC and ITV producers in my time than I care to think of and I often ask them why they put something in a certain way. Years ago we had the famous Oxford confrontation between Huxley and Bishop Wilberforce which was dramatised on TV in about five successive years, each time more dramatic and more scary than the one before. And I used to wonder why they did it. And several of them said that they knew it was actually not historical but it gets an audience and that's it! The media like confrontation, they do not like consensus as it makes bad television. I think it's almost as simple as that in some respects.

But the other thing I want to say is that the Draper-White thing is very interesting, particularly in relation to America where they were both first published. I am not sure when they first made a big impact in Britain, but in Britain there was a very formidable movement to create the illusion of conflict generated by a secret society called the X Club which was mainly made up of Fellows of the Royal Society who were all agnostics and who were determined to use science to beat down the church for their own political reasons. Now I have been through the minutes of this X Club and through hundreds of letters relating to this and I have never once found a single reference to either Draper or White. It seems as though it was independent; I think they came over to Britain rather later.

Brian Heap: This was Thomas Huxley?

Colin Russell: Yes, it was Huxley.

Ron Numbers: Well as you probably know, Draper gave a talk before the so-called Huxley-Wilberforce debate and bored everybody to death; so they probably didn't want to read anything by Draper!

Colin Russell: He was a good photochemist, though.

Ron Numbers: Yes he was.

Denis Alexander: There may be some others round the table who haven't contributed yet and might want to chip in as time is passing. If there are points or queries you want to raise this is your opportunity.

Alison Pearn: Well Darwin used chloroform in the birth of several of his children so he presumably was the anti-Christ! Darwin corresponded and there is quite a good deal of data and information from many clerical friends. Clergy of various kinds, many different kinds, were I think the second largest identifiable group amongst his correspondents, and medics also play a large part. I actually came prepared, so I can even quote you something from a letter from James Brady Innes to Darwin: "Certainly you and I never were like to quarrel over our differences thanks mostly to your most kind forbearance and ..hotheadedness .. I am sometimes amused at the look of wonder which follows my statement in the midst of our Darwinian theory discussion. Mr. Darwin is one of my very most valued and dearest friends. I always think so and say so whenever occasion offers. Dear me, if some of your naturalists and my rich list friends were to hear us two saying civil things to each other, they would say the weather was going to change or Paris to be relieved". (This was in 1871.)

And Darwin replied to say "You are a bold audacious man to tell your clerical friends that you are a friend to me." You can actually look at that in two different ways of course. On the one hand these two men are corresponding and are great friends, and Innes does help Darwin with information, but this is against a backdrop of knowing that they have friends and colleagues who would not feel that this is a good .. I think the closer and closer that you look at the more detailed evidence, the wider the spread and the nuance of feeling and position there is.

Jim Moore: Innes was ordained by Bishop Wilberforce at Oxford.

Alison Pearn: Was he really, I didn't know that.

Ron Numbers: Somebody came up to me during the reception after the lecture and asked if I could offer a good alternative metaphor for the conflict thesis. Well, clearly what Jim has written shows that there wasn't even conflict between Darwin and his vicar! I think one of the problems that we have is that those of us who have been most critical of warfare and conflict don't have a saleable metaphor. I once described John Burke's book as pushing the "complexity thesis" – that was a dead one! I am the only one who uses the "complexity thesis" now I think. **[Brian Heap:** No, he uses it himself]. But it's not a catchy metaphor and what we're finding out more and more is how complex these relationships were over time and that generalisations typically don't hold. Yet I believe the general reader wants something a little bit less complicated than that from us, rather than for us to say "Well it's very difficult". That's not intellectually satisfying to most people.

Denis Alexander: I think it can be intellectually satisfactory but the problem is that as Colin was alluding, the media want straightforward simple answers and it's difficult to sell complex concepts.

Ron Numbers: And part of that is because the *audience* wants straightforward and simple answers, at least in the United States.

Brian Stanley: Is the Faraday Institute doing anything about this? Is there any sort of public, media goal within the goals of the Institute because it does seem to me that this battle

is not going to be won by writing academic monographs. It will be won on the pages of Time magazine or Atlantic Monthly or in BBC documentaries, that sort of level.

Denis Alexander: We are interested in the public understanding of science and religion and we have two relevant enterprises in the pipeline. The first is the publication of the Faraday Papers, which will be brief 4-page papers which will, when they are published and they're very much in the pipeline, actually give a brief overview for journalists and the general public at large on particular issues on science and religion. So they are things that we hope will be accessible to a very broad audience; that's one aspect of what we feel we can do. The other one, which we haven't done much about because we haven't had time and we want to wait a little bit, is to act as a kind of advice bureau, a help desk for the media, and to put the media in touch with people who can give a balanced view, not necessarily give it ourselves but give a balanced view on some of these particular areas. I have done quite a bit for radio and to some extent for TV, but mostly radio in the past few months, and we find we are phoned up quite a bit already without even publicising ourselves at all. I think if we actually wanted to we could get a huge amount of media exposure but we don't actually want it because it's very time-consuming - but we can do some of that.

Jim Moore: Does anyone recognise Faraday as being on £20 notes?

Denis Alexander: Maybe we should feature £20 notes more on our website.

Ron Numbers: Some of you may be happy, others distressed, to know that Templeton has funded a conference on myths and the history science and religion to which TV producers and playwrights and others will be invited to see if there's any gold to be mined in those hills. As we talked about earlier, I think the Templeton Foundation is very disappointed that after throwing millions of dollars at science and religion they haven't changed people's thinking that much. They are now going after a bigger audience and thank goodness they are including historians who are, as I trust Colin Russell was suggesting, the only really unbiased observers! We have no axes to grind!

Denis Alexander: I think that's a very good point on which we should draw to a close this evening. I would like to thank again all of you for coming and joining in the discussion, but thanks especially to Ron for his great and stimulating contributions during the evening.

Who's Who

Prof. Ronald L. Numbers, Hilldale Professor of the History of Science and Medicine, University of Wisconsin-Madison; president of the International Union for the History and Philosophy of Science/Division of the History of Science and Technology.

Prof. Karen L. Steudel-Numbers, Chair, Department of Zoology, University of Wisconsin-Madison; research focuses on the origins and evolution of bipedalism among hominins.

Dr. Denis Alexander, Director of the Faraday Institute and Fellow of St. Edmund's College, cancer and immunology research, The Babraham Institute; Editor of the journal *Science & Christian Belief*, author of *Rebuilding the Matrix* (2001, Lion).

Dr. Ruth Bancewicz, PhD in Genetics, MRC Human Genetics Unit. Christians in Science Development Officer, and consultant (resource pack project), the Faraday Institute for Science and Religion.

Dr Andrew Cunningham is a research fellow within the Department of History and Philosophy of Science specializing in the History of Medicine.

Rev Dr Geoffrey Cook, Vice-Master St. Edmund's College; Department of Anatomy, research in developmental neurobiology.

Judith Christie, Solicitor (now retired) currently history of art student and NADFAS committee member with interests in garden history and stained glass.

Dr Claire Cockcroft - Deputy, Corporate Affairs, The Babraham Institute, Cambridge. Manages the Institute's Science & Society programme - including outreach with local schools, press and media liaison and also works closely with Babraham Bioscience Technologies to develop the Bio-incubator facility on campus. Research area - plant biotechnology with particular interest in biotechnology in developing countries; science communication; Fellow of the Winston Churchill Memorial Trust; Biomedical entrepreneurship.

Dr. Juergen Harter, chemist & cheminformatician, currently Senior Chemistry Analyst at Biowisdom Ltd. (research in knowledge management and intelligence networks for pharmaceutical companies), Senior Member Wolfson College.

Prof. Sir Brian Heap FRS, biologist, formerly Master of St. Edmund's College, Vice-President of the Royal Society; Nuffield Council on Bioethics, NATO Science Committee, Brussels and member of Advisory Group of the Templeton Foundation.

Hilary Marlow, Research Associate, Faraday Institute; PhD Student, Faculty of Divinity - the Old Testament and environmental ethics; Open Theological College tutor – Christian faith and the environment.

Dr James Moore, Reader in History of Science and Technology, The Open University; posts at Cambridge, Harvard, Notre Dame, McMaster, and the Australian National universities; author of *The Post-Darwinian Controversies* (1979), *The Darwin Legend* (1994), and with Adrian Desmond, *Darwin* (1991).

Miss Bekki Pearce is the Marketing and Events Manager of the Faraday Institute. She read Physics at Oxford and completed a Masters in Science, Culture and Communication at Bath in 2003. She has worked for the British Association for the Advancement of Science, NESTA and GridPP.

Dr Alison Pearn, Cambridge Director of the Charles Darwin Correspondence Project; associate editor of *The Correspondence of Charles Darwin* (CUP, Vol. 15 2005).

Dr Jason M. Rampelt recently completed his Ph.D. in the History and Philosophy of Science at Cambridge University and will be pursuing the Institute's first research project in scientific biography. Dr Rampelt has also earned degrees in Philosophy (B.A., Case Western Reserve University, Cleveland; M.A. University of Pennsylvania, Philadelphia) and Theology (M.A.R., Th.M. Westminster Theological Seminary, Philadelphia).

Prof. Colin Russell, Emeritus Professor of History of Science at the Open University. Author of *The Earth, Humanity and God* (UCL Press, 1994), *Edward Frankland* (CUP, 1996), *Michael Faraday, Physics & Faith* (OUP, New York, 2000) editor of *Chemistry, Society & Environment* (RSC, 2000) and co-editor of *Chemical History* (RSC, 2005).

Dr Brian Stanley is Director of the Henry Martyn Centre for the Study of Mission and World Christianity, and a Fellow of St Edmund's College. His most recent major publication is volume 8 in *The Cambridge History of Christianity, World Christianities, c. 1815*

Prof. Bob White FRS, Associate Director of the Faraday Institute and Fellow of St. Edmund's College; Dept of Earth Sciences; volcanoes, earthquakes, climate change and other catastrophes; co-author of *Beyond Belief – Science, Faith and Ethical Challenges* (Lion, 2004).