



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.