



Beauty in Science and Christianity

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Thank you for coming, and I would like to thank our hosts for organising this evening's event. I want to speak tonight about how science and faith fit together. [La FE a examen](#), the book that we are launching tonight is an important demonstration that a scientist can be a person of faith. Here are ten successful scientists who are also sincere Christians. They have shown that it is possible to be an intellectual, enquiring person *and* believe in the God of the Bible.

But I also want to show more than this. I want to demonstrate how science can *enhance* faith. Debates and discussion of issues are important, but they are not the whole story. In a video interview on the *Test of Faith* website Professor Alister McGrath – a theologian and former biophysicist – said that it is also important to start new conversations about how science enhances faith. This is not something we hear very often, so I will start with a short story that explains what I mean.

This is a story about a theologian and a telescope. The theologian was a colleague from another department in Cambridge, and the telescope belonged to some friends of his. As we sat down to lunch one day, my colleague mentioned that he had visited these friends the night before. It was a clear night, so they spent some time looking at the stars. My colleague had been a keen amateur astronomer as a teenager, but he had become involved in so many academic debates about science and religion that he eventually lost interest in science. That evening, he was reminded how beautiful and fascinating the universe can be. He realised that the experience of scientific exploration itself can foster awe, wonder and – for people of faith – worship.

For myself, I have found that doing science brings the joy of exploration and the freedom to ask questions. There is a feeling of wonder and awe at what is found and an enjoyment of its beauty. Those moments of discovery raise deeper questions about the universe and our experience of it.

So this evening I will first explain how science complements faith, using some of the ideas from *La fe a examen*. Then I will speak about how science enhances faith. I will use beauty as an example, showing how beauty can raise questions that go beyond science. For a Christian, beauty can also teach them something about God.

¹ This is the text of the lecture delivered at Bilbao, Madrid and Valencia on May 20th, 22nd and 26th of 2014, for the launch of the book *La fe a examen* (Fliedner Ediciones, Madrid, 2014; a translation of the book by Ruth Bancewicz *Test of Faith*, Patesnoster, Milton Keynes, 2009).

First, the relationship between science and faith. In recent years, historians have begun to recognise that religion played a positive role in the development of science. For example the Historian Peter Harrison, who at the time of the *La fe a examen* project was Professor of Science and Religion at Oxford University, said “Perhaps science wouldn’t have emerged in the West at all, had it not been for a certain set of religious convictions about how the world was.”

Let me give you a very brief introduction to this history. From the twelfth century onwards, when Arabic and Greek texts began to make their way to Europe and were translated into Latin, European scholars started to do ‘natural philosophy’ – which was the name for science until the nineteenth century. As this new wave of ancient learning was absorbed and modified by Christian thinkers in Europe, science began to emerge in a form that we would recognise today.

One example of the influence of Christian theology on science is the increasing importance of experiments. The Greek philosopher Plato taught mathematics, which was incredibly important for the growth of the physical sciences, but it lacked an emphasis on experimentation. The early natural philosophers in Europe reasoned that God was not limited by anything when he created, so it is impossible to predict what the material world will be like – you have to go out and study it for yourself. For Galileo Galilei, Isaac Newton, Robert Boyle and others like them, scientific experiments became a key to exploring God’s creation.

So the early scientists saw their work as an act of worship. For them, faith was something that affected the whole of their lives, and their scientific writings were often littered with theological reflections. The universities in medieval Europe taught both science and theology, and at the time they were not even necessarily seen as separate subjects. I will give you just one example from this time. The German astronomer Johannes Kepler, who is famous for his ‘laws of planetary motion’, had originally wanted to be a theologian. He was given the opportunity to be a natural philosopher instead, and realised that this was a worthy vocation for a Christian.

At the end of his book *The Harmony of the World*, Kepler dedicated his work to God. He said, “If I have been enticed into rashness by the wonderful beauty of thy works, or if I have loved my own glory among men, while advancing in work destined for thy glory, gently and mercifully pardon me; and finally, deign graciously to cause that these demonstrations may lead to thy glory and to the salvation of souls, and nowhere be an obstacle to that.”

So while there are inevitably some issues to consider, science is a natural home for a Christian. Science is simply a way of understanding the world that God made and learning to use its resources wisely. The occasional points of conflict between science and faith have been well publicised by those who want to drive a wedge between science and faith. But in reality, these debates were not always ‘scientists versus the Church’. Science has always been supported from the inside by Christians who are passionate about exploring the universe that God has made. And theologians like Alister McGrath, and faithful biologists like Francis Collins - the former director of the Human Genome Project - have demonstrated that even the most serious Christian need not reject evolutionary biology on the grounds of incompatibility with Genesis.

The question is, do we have any data to back up the claim that a genuine Christian believer can also be a serious scientist? The sociologist Elaine Howard Ecklund recently completed a survey of both natural and social scientists in the US. She and her team found that 61% of these people identified themselves as Christians, compared to nearly 74% in the general population. Considering the aggressive nature of the science-faith debate in the US, those figures are extremely encouraging because they show that large numbers of Christians still recognise the compatibility of science and faith. Statistics are not available for the rest of Europe yet, but as the discussion is far less polarised over here, I suspect the proportion of Christians in science would be the same as the number in the general population.

So when I talk to other Christians who work as scientists, they tend to focus on the fact that their research in the lab simply deepens and expands their picture of the world, and of God. Science and faith *do not* have to be kept in separate compartments. As Bill Newsome, Professor of Neurobiology at Stanford University said, "I think ultimately I am a Christian today because my faith makes the best sense of the world and my role in it, both at an intellectual level and a deeply personal level."

And now for beauty. I have explored this area for some time, and I can safely say that it appears to be a universal experience for a scientist to find beauty in the objects he or she studies. Marie Curie said that "I belong in the ranks of those who have cultivated the beauty that is the distinctive feature of scientific research". Ard Louis from Oxford University has described how he sees beauty in the mathematics behind the universe, using the discovery of antimatter as an example. And Francis Collins also talks about the beauty of DNA.

A scientist's experience of beauty is not just fascination, or the devotion of the true professional. But before I can make my case I need to define 'beauty'. Definitions in different times and for different cultures have been varied and contradictory. My own definition of beauty for the purposes of this talk is 'something that is pleasing to the senses'. This can include more abstract qualities that appeal to the intellect as well as the emotions. So a tree might be beautiful because it is covered in blossom, but also because it has an unusually symmetrical shape. I will assume that beauty is a matter of taste most of the time, but some scientists think it is an indicator of truth.

Of course, the things scientists find beautiful do not always seem attractive to anyone else – though perhaps you can appreciate their enthusiasm. Jeff Hardin is Professor of Zoology at the University of Wisconsin-Madison, and he is also a Christian. He and the members of his lab study a tiny transparent roundworm called *C. elegans*, which shares many of the most basic functions of our own bodies. Most *C. elegans* adults are hermaphrodites, so they make some sperm, then switch to making eggs and fertilise themselves. One could find this life cycle depressing, but that is not the take-home message for Hardin. He said that "Knowing the steps in a complicated bit of ballroom dancing leads to greater appreciation for the skill of the dancers, and it is the same with *C. elegans*. Watching these tiny embryos in exquisite detail using powerful microscopes gives us a deep sense for the intricate cellular choreography that build their bodies."

So a scientist may find beauty in the objects they study – the data – whether that is a group of organisms, a diagnostic printout, or series of molecules. There is also the beauty of the experiment that is well-designed, and carried out with skill and patience. This is the sort of work that produces good clear results: the molecular biologist's sharp DNA bands on a gel, the organic chemist's high yield, or the physicist's precise measurements. When you focus hard on a technically demanding experiment and manage to complete it successfully, the outcome is a piece of work that is often very beautiful as well as useful. Colleagues admire your work, and ask you to teach them your techniques.

Another kind of beauty is introduced by the scientists themselves: perhaps some elegantly drawn graphs, or a carefully crafted presentation filled with photographs of microscopic organisms. This process of adding beauty to your work is extremely satisfying, particularly if it helps your colleagues, friends and family to appreciate why you spent all those days and nights in the lab.

Finally, there is a more abstract kind of beauty in science. The first person to define this for me was a theologian. Jürgen Moltmann has been fascinated by science since he was a teenager, and he said that we see beauty in science when systems are moving from chaos to order, or vice versa. He is convinced that scientific beauty is not worth seeking for its own sake, but that it can be a sign that you are nearer the truth.

Some of the best examples of this last type of beauty come from physics. A theory or mathematical equation that makes sense of a collection of data can have a beauty of its own. I find it hard to appreciate the beauty of equations, but physicists call them beautiful when they show simplicity, symmetry and unity. If a theory can be used to make predictions for further experiments and explain other types of data, then that adds to its beauty.

So where does beauty take us? For some scientists, the beauty they see in their work points to a reality beyond science. The American cell biologist Ursula Goodenough rejects traditional religion, but gives time to thinking about what she calls 'ultimate questions'. She said "the remarkable beauty of the cell, of everything that is... continues to draw me to spiritual issues."

Jeff Hardin explained to me his own experience of beauty in the lab. He said, "I could talk about the theologian Rudolph Otto's 'sense of the numinous' - a spiritual feeling. But is there something more concrete than that? Is it, as the biblical scholar Tom Wright says, an 'echo of a voice'? I'd like to suggest to my colleagues that creation itself is calling out to us, saying something about its creator."

When he says that scientific beauty speaks of God, Hardin is part of a tradition that began over two thousand years ago. The Old Testament tells how the whole world speaks a message about the God who created everything. Psalm 19 says that "The heavens declare the glory of God; the skies proclaim the work of his hands", and in Psalm 29 we read that "... the God of glory thunders, the Lord thunders over the mighty waters". The beauty of the land and everything in it is celebrated: mountains and trees, plants and animals, men and women.

The beauty of the world reflects God's own beauty, as well as his power, wisdom and goodness. This is a God who creates order out of chaos, making a dynamic and interconnected world that reflects his glory. Of course there are issues about how far this type of natural theology can be taken. In the end, only Jesus reveals God fully. His life and teaching, death and resurrection demonstrated God's great love for every one of us; his gentleness, forgiveness, and generosity; and his uncompromising attitude to injustice and religious hypocrisy.

I will finish with some reflections from the scientist's point of view, but they apply to us all. Scientists enjoy beauty in the same way that we enjoy the serenity of a garden or a carefully tended olive grove on a summer's day. Bringing order from chaos, watching things develop and become chaotic again and bringing order once more is one of the most fulfilling experiences in life. It involves reason, creativity and imagination. The elegant mathematical solution, or the model that makes sense of the data, is the beauty of 'shalom' - the Hebrew word whose definition includes peace, contentment, welfare and completeness. Not only is the prospect attractive, but it is also deeply satisfying, ordered and harmonious.

To achieve that state the scientist, gardener or farmer has expended time and energy. The process can be protracted, complicated, expensive and at times painful, but somehow we have the drive to do it over and over again. To me, the Christian teaching that God has made us 'in his image', and often uses long and complex processes in order to work out his plans in the world, makes perfect sense of that experience.

C. S. Lewis thought that our experience of beauty was a taste of something to come, and he wrote about this in his essay *The Weight of Glory*. We want everything to be beautiful and ordered, but it isn't. We are never fully satisfied. The beauty of creation awakens something in us, and we want to find its source. Lewis would say that we have a "desire for our own far-off country". In other words, what we are longing for is the "new heaven and... new earth" that are promised in the symbolic account of the end of time in Revelation.

So my response to the beauty I see in nature is to enjoy it, and to be grateful for it. When we open ourselves up to surprise, fascination and curiosity, that makes us aware of the bigger reality that includes ourselves and the rest of creation. For scientists like Jeff Hardin and myself, the beauty we see in creation reminds us of God and moves us to both wonder and worship.

Thank you for listening.



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After reading Genetics at *Aberdeen University* (UK), she completed a PhD at *Edinburgh University* (UK), based at the *MRC Human Genetics Unit*, working on gene-environment interactions during vertebrate development.

She spent two years as a part-time postdoctoral researcher at the *Wellcome Trust Centre for Cell Biology, Edinburgh University*, while also working as the Development Officer for *Christians in Science* - a post she held for three years, before moving full-time to the *Faraday Institute* to develop the [Test of FAITH](#) resources, the first of which were launched in 2009.

Ruth Bancewicz has been researching on the positive interaction between science and faith. After developing the *Test of FAITH* resources project, she is currently working on other projects for outreaching projects on science and faith relations. In fact, this lecture is based on one of the chapters of his future book *God in the Laboratory: How Science Enhances Faith*.