THE WONDER OF SCIENCE

Exploring the creation/ evolution debate

- Science and Faith
- Genetics and Evolution
- Earth and Atmosphere
- Cell Biology and Chemical Evolution
- Space Science

Dominic Statham

For Christian parents, teachers, students, and others

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Background: Much of the material herein originally formed a series of five booklets published by Christian Education Europe (www.christian.education) as teaching guides for the National Curriculum in England Science Programme. They were aimed at independent schools that wanted to cover this same material but in a more balanced way, giving due coverage to the biblical creationist position. The content of these was subsequently woven together with minor revisions to provide a comprehensive single work with worldwide applicability and usefulness.

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Foreword

By Jonathan Sarfati, Ph.D., FM

Many parents ask what they can use to help their high-schoolers learn real science without the evolutionary indoctrination. I strongly recommend this very informative and readable book that covers a wide variety of science topics.

The Wonder of Science presents science more clearly and deeply than secular textbooks. Particularly, one thing it teaches clearly, and what is lacking in most science textbooks, is what makes science work in the first place. This book remedies that by explaining the underlying assumptions of science, and how the Christian worldview provided these logical foundations. Therefore, despite widespread misconceptions, Christianity overall had a very positive effect on most of the greatest scientists and their work.

Students will learn a considerable amount from this book about all of the different branches of science discussed. But unlike secular textbooks, they will also learn about severe problems with evolution—cosmogonic, geological, chemical, and biological. They will also learn about evidence from these branches that lines up better with biblical creation.

The book has been written primarily for adults—parents and teachers—but will also be useful for students, with different sections appropriate for different ages.

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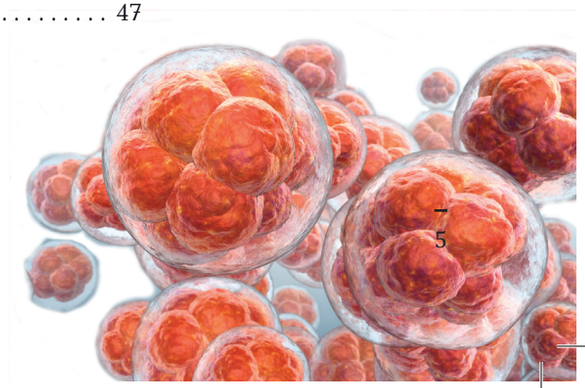

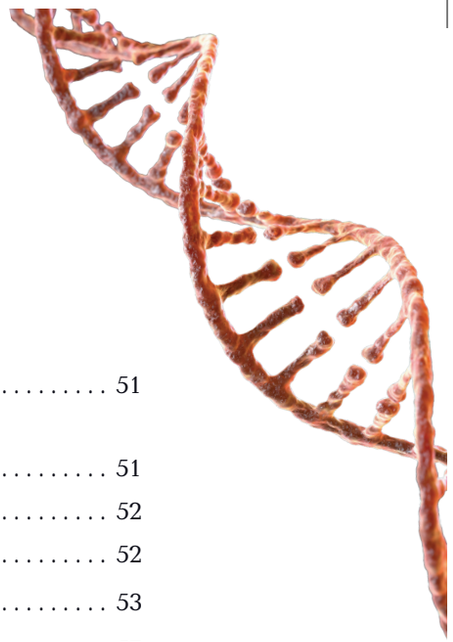

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A Chartered Engineer, Dominic (Dom) is a graduate of Loughborough University in the UK. He has extensive experience of both manufacturing and product development and holds a number of patents. When employed by Rolls Royce, he worked on projects for the Panavia Tornado and Eurofighter Typhoon and when employed by GKN, engineering drivelines for Jaguar and Land Rover vehicles. For ten years he was a speaker and writer for Creation Ministries International (UK/Europe) and is the author of *Evolution: Good Science? Exposing the ideological nature of Darwin's theory* and co-author (with Professor Stuart Burgess of Bristol University) of *Inspiration from Creation: How engineers are copying God's designs*.

For more information, see creation.com/dominic-statham.

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Preface

In much of the Western world, there is an alarming exodus of young people from the church. Research by the Barna Group (conducted in 2002) indicated that, in the USA, around 66% of children raised in Christian homes will reject the faith as adults.[1] A more recent study (conducted in 2017) suggested that the figure is little different today.[2] Speakers working for Christian apologetics organisations such as *Creation Ministries International* (CMI) hear story after story, told by distraught parents, of how 'going to university' marked the end of their teenagers' church attendance.

While there is no one reason for this, there can be no doubt that a major factor is a perceived conflict between Christianity and science. According to Barna, nearly a third of young adults with a Christian background feel that "churches are out of step with the scientific world we live in" and a quarter embrace the perception that "Christianity is anti-science".[3] The National Study of Youth—the most extensive sociological project on youth and religion ever undertaken—found that seventy percent of young adults from Christian backgrounds believe that "The teachings of science and religion often ultimately conflict with each other".[4]

For many, such views are nurtured in the secular state education systems which now dominate across much of the developed world. Particularly, pupils are persuaded that science has conclusively demonstrated that to believe the biblical account of creation is nothing more than folly. One Australian Youth Minister testified:

> I used to beat my head against a wall wondering why we lost all our young people at about age 15–16. In the last few years I've realized that this is when they teach evolution in depth in science. Chatting with some of the students I have also discovered that some of the teachers actually identify the Christian students and make a special point of explaining the differences and difficulties in reconciling Genesis and the 'facts' of evolution. It's no wonder we lost them. I come near tears just thinking about it.[5]

As a 'creation speaker' for nearly ten years now, I have often heard stories of young people who have been similarly indoctrinated; and what is perhaps most exasperating is that there is absolutely no need for this. In almost every case, the arguments that they have accepted—and which have led to their rejection of the Bible and Christianity—are ones that were answered comprehensively years ago. In some cases, they are arguments that evolutionists themselves no longer use due to their having been so thoroughly discredited. In this we are reminded daily of the reality of God's words to the children of Israel: "My people are destroyed for lack of knowledge" (Hosea 4:6).

On a positive note, a recent study indicated that students who were given answers

to their questions as teenagers retain their Christian convictions when they leave home, despite being taught evolution at school. Most significantly, of those who still held to biblical creation, every single one still attended church regularly.[6]

Many parents feel powerless to deal with this situation, however, largely due to their own lack of scientific training—and hence the reason for this book. Parts 2–5 take the reader, step by step, through the basics of genetics, cell biology, geology and space physics, and on to a level needed to engage meaningfully with the origins debate. At the same time, they are designed to cover all the related material typically required by school science curricula. Those who do not have prior scientific training might prefer to digest Parts 2–5 before reading Part 1, which deals with the more philosophical aspects of the creation/evolution debate.

Contrary to endless assertions by the media, the theory of evolution is not scientifically driven, but ideologically driven. The real 'evidence' for evolution lies in a commitment to naturalism, a determination by many modern academics to explain our existence without reference to a creator. The creation/evolution debate is not about science vs faith, but about one faith (or worldview) vs another—faith in natural processes as sufficient to produce all that we see around us vs faith in an all-powerful and all-knowing creator God.

Part 1: *Science and Faith* encourages the student to think about the true nature of science and distinguish between this and the religion of scientism. It explains how modern science arose out of a belief in biblical creation and how scientific thinking was made possible as people saw nature as having been designed.

Part 2: *Genetics and Evolution* provides the basic knowledge that will enable students to begin to answer the question: Which worldview is really best supported by the evidence—Darwinian evolution or special creation?

Part 3: *Earth and Atmosphere* will equip students to understand the heart of the controversy—the history and age of the earth. Having explained the basics of geology, the different views of how rocks formed are discussed. Powerful evidence is presented challenging the dogma of 'deep time' and the belief that fossils provide a record of millions of years of natural history.

Part 4: *Cell Biology and Chemical Evolution* builds upon the material in Part 2 and provides a more adequate picture of the astonishing complexity of even the simplest living things. Armed with this information, students will be able to evaluate the claim that natural processes (i.e. 'chemical evolution') could have produced life from ordinary (non-living) matter.

Part 5: *Space Science* deals with astronomy and cosmology. It provides an understanding of Earth's place in our solar system, our galaxy and the universe, together with a critique of evolutionary explanations for their origins.

Although secular views are explained, the main thrust of the book is to present science as it should be taught—within the context of the Christian worldview that birthed it. I pray that in so doing, the reader's eyes will be opened that they might be enabled to behold the true wonder of science—and be moved to worship the One whose great wisdom conceived it, and whose great power brought it into existence.

Dominic Statham

References for Preface

1. Barna, G., *State of the Church*, Issachar Resources, Ventura, California, p. 109, 2002.
2. In a survey of young adults who attended a Protestant church regularly as teenagers, only 33% were regularly attending in their twenties. Church Dropouts: Reasons young adults stay or go between ages 18–22, Lifeway Research, 2017; lifewayresearch.com.
3. Barna Group, Six reasons young Christians leave church, 27 September 2011; barna.com.
4. Smith, C., How American Youth (Mis)Understand Science and Religion, Lecture given at the University of Notre Dame, February 2014; youtube.com/watch?v=OaS1SV7xwWQ, time code 11:53–15:12.
5. Schmidt, G., letter to Tas Walker, 10 October 2004.
6. Fallout: Students explain why they left or remained in the church; creation.com/fallout.

Part 1:
Science and Faith

Introduction to Part 1

We live in a scientific age, and our lives have been greatly enriched by the remarkable technological advances of the past 150 years. As a result, in many people's thinking, the scientist has become a reliable and authoritative source of truth: the expert—or even guru—even if his or her area of research and methodology is still regarded as somewhat obscure, and hard for the layman to comprehend. Popular science programs on TV and radio reinforce the idea that the natural world, in all its beauty and complexity, is being investigated, understood and brought under human control—and for the ultimate benefit of society. Science is regarded as objective and neutral, and free from the values and beliefs of earlier, less informed generations. But to what extent is this true?

This scientific revolution has been reflected in our education system, where successive curricula seek to raise the knowledge and awareness of young people about science and the scientific method, and to train and equip them for appropriate careers in this modern age. The phrase 'How Science Works' has become a common mantra in the resulting programs of study. But do current Western syllabuses accurately reflect the true history and philosophy of science? Is there, for example, an implicit assumption of materialism—that matter is all there is, and that, whatever the subject under discussion, only naturalistic explanations are permitted?

This opening part of *The Wonder of Science* has been written to explore these and related issues. It is intended as beneficial reading for everyone, including science teachers. It will help all to appreciate the limits of science and its relationship to other disciplines. Readers may find their perception of the 'credibility' of certain arguments significantly challenged by

the content, but the intention in the end is that they will understand better *how* to think, rather than *what* to think!

Some of the material in this part may seem challenging; but I would encourage the reader to remember the words of Christ: "Seek and you will find" (Matthew 7:7). To fully grasp the arguments will require perseverance. Do reread any parts that you don't understand, more than once if need be. Ask questions, and keep asking, until you get the answers. It will be well worth the effort.

Science

What is science?

According to the *Cambridge English Dictionary*, science is "The careful study of the structure and behaviour of the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities."[1] In reality, however, philosophers of science do not always agree about how to define science. This is because scientists working in different fields do different kinds of work and use different methods. For example, some perform experiments in laboratories; others produce mathematical models of natural phenomena; some classify living organisms into various categories; others attempt to reconstruct past (historical) events.

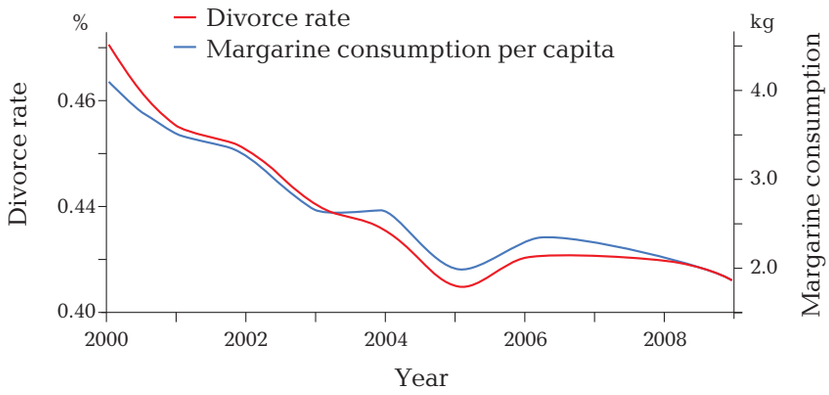
The task of some scientists is to gain knowledge of the laws which govern how the natural world works. Strictly speaking, they seek to describe these laws rather than explain them. For example, although Isaac Newton enabled us to calculate the effect of gravity, he couldn't tell us what gravity is and neither can anybody today. Similarly, we know that positively charged particles attract negatively charged particles; but we don't know why. Nor can science tell us where these laws came from.

Sometimes scientists make observations and formulate hypotheses to explain them. They then test these hypotheses, often by making further observations—for example, by performing experiments. This process is often referred to as the scientific method (although it is only one among many methods that a scientist might use). If tests consistently indicate the hypothesis to be true, it becomes a scientific theory. The word 'theory' in this sense does not refer to 'speculation', 'guesswork', or 'conjecture', but a well-substantiated explanation of data. Scientific theories can be used to formulate scientific laws, which are precise statements describing how the natural world behaves. These are often stated mathematically.

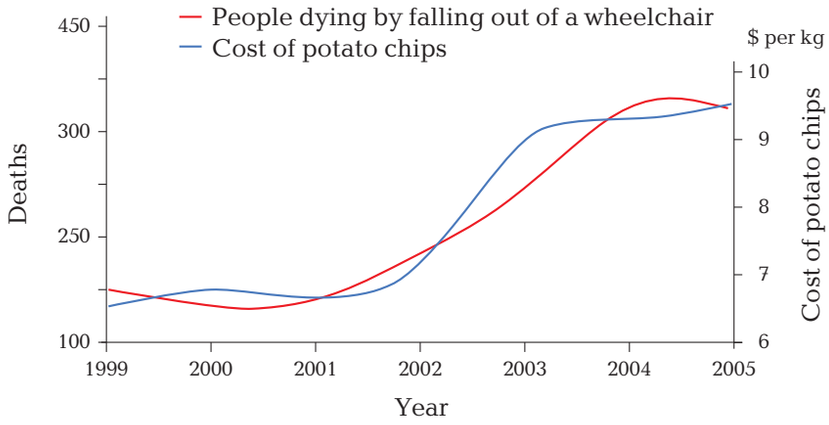
The need for care when employing the scientific method

It is important to remember that a set of data (i.e. some observations) may, at first sight, appear to indicate that a hypothesis is true when, in fact, it is not. For example, the data presented in the graphs below are consistent with the claims that margarine consumption increases divorce rates and that a rise in the cost of potato chips makes it more likely that people will die if they fall out of a wheelchair. Common sense, however, would cause a thinking person to be very skeptical of these claims! (See also Part 1, Case study 3, 'The logical fallacy of affirming the consequent'.)

In science it is impossible to *prove* a hypothesis to be true, no matter how many tests turn out positive; but it is possible to disprove it by



Graph 1: An apparent relationship between divorce rate and margarine consumption.



Graph 2: An apparent relationship between people dying as a result of falling out of a wheelchair and the cost of potato chips.

showing that just one test turns out negative—assuming of course the experiment has been done correctly. Albert Einstein wrote that "the truth of a theory can never be proven. For one never knows if future experience will contradict its conclusion."[2] Hence all science is tentative and subject to change. Moreover, sometimes a scientific theory or law is found to apply only under certain conditions, an example being Hooke's Law of Elasticity (see Part 1, section: 'The scientific revolution').

Strictly speaking, proofs exist only in mathematics and logic. Renowned philosopher of science, Sir Karl Popper, argued that unless a theory is falsifiable, it cannot be considered to be part of empirical science.

Evolution and the 'theory' word

While biblical creation scientists do not accept the 'big bang to man' theory of evolution, and maintain that such a view is poorly supported by science, they do not argue that 'evolution is just a theory'. This is because, when evolutionists speak of 'the theory of evolution', they are using the word 'theory' in the sense normally understood by scientists, namely as a well-established explanation, verified by observations. Instead, biblical creation scientists would say that evolution is an 'unsubstantiated hypothesis'.

Science and technology

Although technology often utilizes knowledge gained through the scientific method, it is possible to develop technology without doing science. For example, the adhesive and waterproofing properties of tree resin might be discovered by accident, and then used as pitch to help seal the hulls of wooden ships; the Chinese developed gunpowder by trial and error. Many inventions, such as wheels and clocks, were also possible without formulation of scientific laws.

Similarly, it is possible to gain other types of knowledge without doing science. In medieval times, the Arab world gathered together much of the learning of neighbouring peoples—Greeks, Persians and Indians—even translating their literary works into Arabic. This included books on philosophy, mathematics, astronomy and medicine. However, none of this led to their scholars adopting the scientific method and discovering scientific laws.[3,4]

The scientific revolution

Modern science is often said to have begun in 1543 with the publication of *De Revolutionibus Orbium Coelestium Libri VI* (Six Books Concerning the Revolutions of the Heavenly Spheres).[5] In this, Nicolaus Copernicus (1473–1543) argued that the earth revolves around the sun rather than the sun around the earth (dealt with briefly below, and in greater depth in Part 5). Within less than a century, his pioneering work had turned into a scientific revolution.

In 1609, Johannes Kepler (1571–1630) published his *Astronomia Nova* (New Astronomy) in which he set forth what are known as his first and second laws of planetary motion (see Part 1, section: 'Kepler's laws of planetary motion').

In 1620, Francis Bacon (1561–1626), often referred to as the 'father of modern science', published his *Novum Organum Scientiarum* (New Instrument of Science) in which he developed the principle of inductive reasoning used extensively by scientists today (see Part 1, section: 'Deductive and inductive reasoning in science').

In his 1623 book, *The Assayer*, Galileo Galilei (1564–1642) argued that the laws of nature can be stated mathematically. He also conducted experiments to understand motion and discovered that the time taken for a pendulum to swing back and forth is proportional to the square root of its length.

In 1637, the French mathematician René Descartes (1596–1650) published his *La Dioptrique* (Optics) which included a statement of his Law of Refraction. This law is also known as Snell's Law, after Willebrord Snel van Royen (Snellius, 1580–1626), who discovered it independently.

In 1660, Robert Boyle (1627–1691), who is often referred to as 'the father of modern chemistry', published his *New Experiments Physico-Mechanical, Touching the Spring of the Air and its Effects*, in which he presented the work he had done with Robert Hooke (1635–1703) on pneumatics. Two years later he formulated what became known as 'Boyle's Law' which describes the relationship between the pressure and volume of a gas.

In 1687 Isaac Newton (1642–1727) published his *Philosophiae Naturalis Principia Mathematica* (Mathematical Principles of Natural Philosophy) often referred to simply as '*the Principia*'. In this, he stated his three laws of motion and his Law of Gravity.

Hooke's law

Hooke's Law, also known as the Law of Elasticity, is named after the English polymath, Robert Hooke (1635–1703), who discovered it in 1660. He described this in 1678 using the Latin words, '*ut tensio, sic vis*', which means: 'as the extension, so the force'. In other words, the extension is proportional to the force (see fig. 1-1). This can be expressed mathematically as $F = kx$, where F = force, x = extension and k = the spring constant (a measure of its stiffness).

As with many scientific laws, however, this only holds true under certain conditions—in this case only within the elastic range of the spring. Fig. 1-2 shows how, when stretched beyond this, Hooke's law no longer applies.

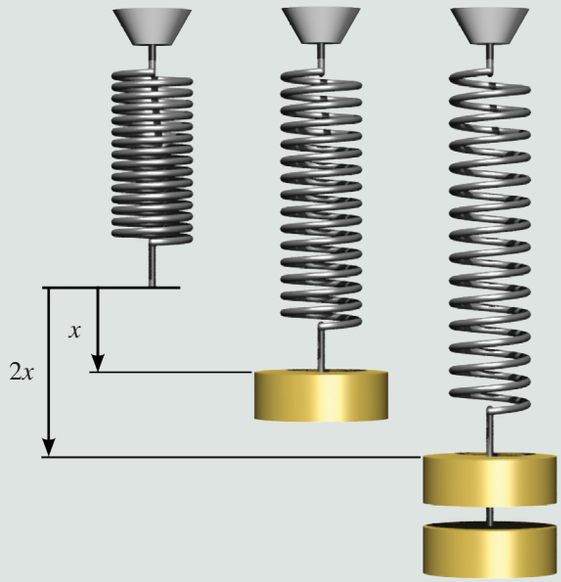


Fig. 1-1. Illustration of Hooke's Law of Elasticity. By doubling the weight hanging from the spring, the downward force is doubled, leading to a doubling of the extension of the spring.

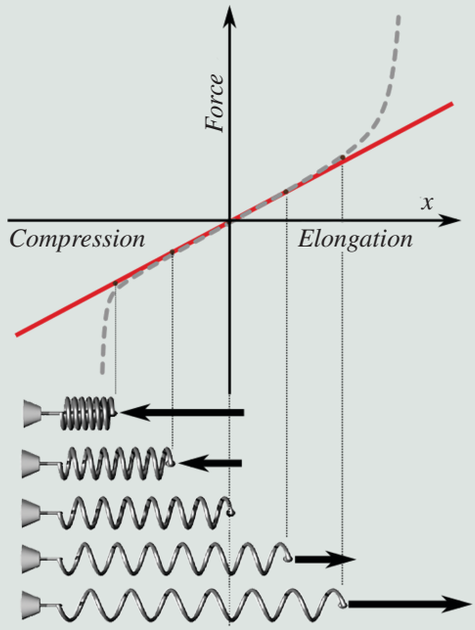


Fig. 1-2. At first, in both extension and compression, the dashed line overlies the red line, showing a linear relationship of force versus displacement, as predicted by Hooke's law. Beyond the elastic range, the relationship becomes non-linear.

Geocentrism and heliocentrism

The geocentric model—from Greek, *ge* (the earth) and *kentron* (centre)—holds that the earth is the centre of the universe, that it is stationary, and that the sun (together with the rest of the universe) revolves around it. It is also known as the 'Ptolemaic system', after the second-century Greek astronomer, Claudius Ptolemy (c. AD 100–c. 170) who developed a geocentric model previously proposed by Aristotle (385–322 BC).

The heliocentric model—from Greek, *helios* (the sun)—holds that the sun is the centre of a 'solar system' where the earth, together with its neighbouring planets, revolves around it. It is also known as the 'Copernican system', after Nicolaus Copernicus (see above). Copernicus realized that heliocentrism necessitates

acceptance of the geokinetic view—from Greek, *ge* (the earth) and *kinesis* (motion)—according to which the earth is spinning as well as orbiting the sun.

In 1610, Galileo's observations of Venus falsified Ptolemy's system (see Part 5, section: 'Galileo Galilei') and this was used by supporters of Copernicus to argue for the heliocentric model.

Kepler's laws of planetary motion

Building on Copernicus's heliocentric model and the incredibly accurate pre-telescope measurements of Tycho Brahe (1546–1601), Kepler discovered that the planets move in elliptical rather than circular paths (fig. 1-3), and that a planet's speed increases as it moves closer to the sun. His three laws might be stated as follows:

1. The planets move around the sun in elliptical orbits, each having the sun as a focus (one of its focal points).
2. A line joining a planet and the sun sweeps out equal areas during equal intervals of time.
3. The square of the planet's orbital period (the time taken for one complete revolution) is proportional to the cube of its mean distance from the sun.

Kepler's model was eventually accepted as being the correct one for a number of reasons. Of all the competing models, his predicted the movements of the planets the most accurately—finally,

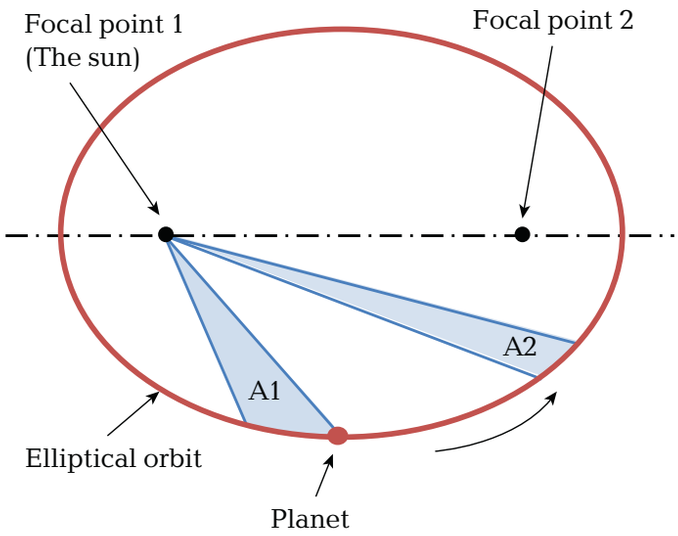


Fig. 1-3. Elliptical path of a planet orbiting the sun (not to scale). The ellipse has two focal points (foci), one of which is the sun. The two shaded sectors, A1 and A2, have the same surface area, and the time taken for the planet to sweep segment A1 is equal to the time taken to sweep segment A2. This is because the planet's speed increases as it approaches the sun.

theory and practice seemed to agree! Also, while previous models were inconsistent with Newton's laws, Kepler's fitted perfectly. For example, the force due to gravity is insufficient to keep the sun orbiting the earth once per day (as with Ptolemy's geocentric view), but just right to keep the earth orbiting the sun once per year (as with Kepler's heliocentric view).

(For a comprehensive refutation of the notion that the Bible teaches geocentrism, see Part 5, section: 'Does the Bible teach geocentrism?')

The Christian roots of science

According to eminent historian of science Professor Alfred North Whitehead,

> [T]he mentality of an epoch springs from the view of the world which is, in fact, dominant in the educated sections of the communities in question.[7]

In seeking to explain why science flourished in the seventeenth century and only in Western

Deductive and inductive reasoning in science

Deductive reasoning starts with the general and moves to the specific. For example, we might begin with the premise, 'All men are mortal.' Then, based on a second premise, 'John Smith is a man', we would conclude that, 'John Smith is mortal.'

Inductive reasoning starts with the specific and moves to the general. For example, we might begin with the observation, 'In the past, every time we have conducted an experiment whereby we have accelerated an object, the force required to do so has always been equal to the mass of the object times the acceleration. In our experience, this has always held true whatever the magnitude of the acceleration and whatever the mass of the object.' We might then draw the conclusion that, 'There is a general law, Force = Mass × Acceleration.'

While the conclusions drawn from deductive reasoning are certain, conclusions drawn from inductive reasoning are not. For example, in the case of inductive reasoning given above, it is *theoretically possible* that, one day, it might be found that with a particular mass and a particular acceleration the law does not hold true.[6]

Europe, Peter Harrison, formerly Professor of Science and Religion at Oxford University, wrote,

> The idea of mathematical laws of nature, it will be argued, is unique to the early modern West and is underpinned by theological considerations that arise out of Western monotheism.

He concluded that part of what made science possible was "the theologically informed assumption that there are laws of nature, promulgated by God and discoverable by human minds."[8]

Loren Eiseley, formerly Professor of the History of Science at the University of Pennsylvania Museum, would agree. Referring to the work of Professor Whitehead, he wrote (bold emphasis in original),

> [I]t is the Christian world which finally gave birth in a clear articulate fashion to the experimental method of science itself. Many things went into that amalgam ... [b]ut perhaps the most curious element of them all is the factor dwelt upon by Whitehead—**the sheer act of faith that the universe possessed order and could be interpreted by rational minds**. For, as Whitehead rightly observes, the philosophy of experimental science ... began its discoveries and made use of its method in the faith, not the knowledge, that it was dealing with a rational universe controlled by a creator who did not act upon whim nor interfere with the forces He had set in operation ... . It is surely one of the curious paradoxes of history that science, which professionally has little to do with faith, owes its origins to an act of faith that the universe can be rationally interpreted, and that science today is sustained by that assumption.[9]

The scientific method presupposes that the universe has certain characteristics; namely, that it is orderly and behaves consistently, being governed by natural laws—and this is what would be expected from the Christian 'worldview'.

The God of the Bible is orderly; for example, He made the sun and moon to serve "for signs and for seasons, and for days and years" (Genesis 1:14; 1 Corinthians 14:33). He is also consistent (e.g. Isaiah 46:10–11; 1 Samuel 15:29; Malachi 3:6; James 1:17), faithful (e.g. 1 Corinthians 1:9; Numbers 23:19; 2 Timothy 2:11–13) and a law-giver (e.g. James 4:12).

Since God reveals Himself (in part) through what He has created (Psalm 19:1; Romans 1:18–20), it would be expected that His creation would display these aspects of His nature, and would point to His glory and greatness.

The God of the Bible is the lawgiver in both the moral and physical realms. He gave the Ten Commandments to Moses (Exodus 20:3–17) and wrote the requirements of the law on the hearts of men so that they "by nature do what the law requires" (Romans 2:14–15). He is the one who gathered the waters together (Genesis 1:9) and "assigned to the sea its limit, so that the waters might not transgress his command" (Proverbs 8:29). He "made a decree for the rain and a way for the lightning of the thunder" (Job 28:26).

He created the sun to govern the day and night (Genesis 1:16), and "commanded the morning ... and caused the dawn to know its place" (Job 38:12). He created the stars to mark the seasons (Genesis 1:14), knows "the ordinances of the heavens", and established "their rule on the earth" (Job 38:33). He continually "upholds the universe by the word of his power" (Hebrews 1:3).

In the Bible, God's commands to nature are often expressed in legal language. For example, the Hebrew word *huq* is used in both Proverbs 8:29 and Job 28:26. Its verbal form means to 'engrave' or 'legislate' and is often used in the context of God giving moral and ritual laws. To the Hebrews, the courses of the planets, the oceanic tides and the universe in general were regular and predictable because they were determined by the God of the Bible who is faithful and sure. They were governed by an unchanging God, and hence behaved consistently from one day to the next.

There being one eternal creator God (e.g. Deuteronomy 4:35 and Psalm 90:2) would indicate uniformity (consistency) across space and time, and man being made in God's likeness (Genesis 1:26–27) would suggest that it is possible for us to understand at least some of what God has made.

Our having been given dominion over the creation (Genesis 1:26–28) and our having been commanded to love God with our minds (Luke 10:27) also provides moral justification for studying it (see also Proverbs 25:2). Indeed, to do so would bring glory to the Creator (1 Kings 4:30–34). As explained by Rodney Stark, Distinguished Professor of the Social Sciences at Baylor University,

> Christianity depicted God as a rational, responsive, dependable, and omnipotent being and the universe as his personal creation, thus having a rational, lawful, stable structure, awaiting human comprehension ... [t]he rise of science ... was the natural outgrowth of Christian doctrine: Nature exists because it was created by God. To love and honour God, one must fully appreciate the wonders of his handiwork. Moreover, because God is perfect, his handiwork functions in accord with immutable principles. By the full use of our God-given powers of reason and observation, we ought to be able to discover these principles.[10]

In other words, "Christians developed science because they *believed* it *could be* done and *should be* done" (emphases in original).[11] Unsurprisingly, then, many of the founders of modern science were Bible-believing creationists. Professor Stark listed fifty-two prominent scientists who lived between 1543 and 1680, and noted that only one—Edmond Halley—was an atheist. (Recent research however has put even Halley's atheism into doubt.[12]) Moreover,

Einstein's heroes: Biblical creationists

On his study wall, Albert Einstein hung pictures of his three great heroes. They were Isaac Newton, Michael Faraday and James Clerk Maxwell.[29]

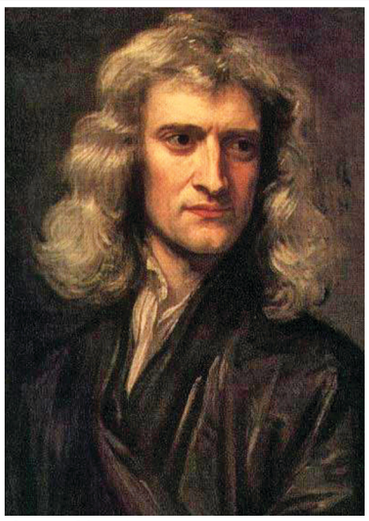
Newton has been described as the greatest scientist of all time. As well as being a brilliant mathematician, he revolutionized the science of optics and formulated the theory of gravity. Alongside his outstanding contributions to science, he spent much time studying theology and wrote, "I have a fundamental belief in the Bible as the Word of God, written by men who were inspired. I study the Bible daily."[30]

Faraday has been described as the greatest experimental scientist ever. A brilliant physicist, he was the first to produce an electric current from a magnetic field and invented the first electric motor. Like Newton, he was a devout Christian and served as an elder in a local church, preaching and leading worship. He wrote that "The book of nature, which we have to read, is written by the finger of God"[31] and his belief that God filled all of space helped him discover facts about magnetism and electricity that other scientists missed.[32]

Maxwell's work enabled a greater understanding of electricity and magnetism and paved the way for the development of radios, X-rays, colour photography, and thermodynamics. Einstein described his work as "the most profound and the most fruitful that physics has experienced since the time of Newton."[33] Like Newton and Faraday, Maxwell held the Bible in the highest regard and once rebuked a colleague for doubting the literal truth of the biblical account of the Noahic Flood.[34] As he approached his death, a visiting minister noted,

> [H]is illness drew out the whole heart and soul and spirit of the man: his firm and undoubting faith in the Incarnation and all its results: in the full sufficing of the Atonement: in the work of the Holy Spirit.[35]

Maxwell himself testified, "The only desire which I can have is like David to serve my own generation by the will of God, and then fall asleep."[36]



Isaac Newton

Michael Faraday

James Clerk Maxwell

at least 60% of these could be described as 'devout'.[13]

According to Copernicus, the universe was "built for us by the Best and Most Orderly Workman of all."[14] He also wrote,

> To know the mighty works of God, to comprehend His wisdom and majesty and power; to appreciate, in degree, the wonderful workings of His laws, surely all this must be a pleasing and acceptable mode of worship to the Most High, to whom ignorance cannot be more grateful than knowledge.[15]

In Kepler's thinking,

> The chief aim of all investigations of the external world should be to discover the rational order and harmony which has been imposed on it by God and which He revealed to us in the language of mathematics.[16]

In his *Epitome Astronomiae Copernicanae* (A Summary of the Astronomy of Copernicus), Kepler explained how his scientific work was inspired by "the highest confidence in the visible works of God", and often interspersed his reflections on scientific method with biblical quotations on the wisdom, power and glory of God.[17]

For Bacon, as with many other seventeenth century scientists, science was a religious duty. He wrote,

> For as the Psalms and other Scriptures do often invite us to consider and magnify the great and wonderful works of God, so if we should rest only in the contemplation of the exterior of them as they first offer themselves to our senses, we should do a like injury unto the majesty of God.[18]

Indeed, for Bacon there were "two books laid before us to study, to prevent our falling into error; first, the volume of the Scriptures, which reveal the will of God; then the volume of the Creatures [created things], which express His power."[19]

Galileo wrote that "the book of nature is a book written by the hand of God in the language of mathematics"[20] and referred to the divine Creator as a 'craftsman' and an 'architect', concepts which inspired him to conduct experiments so as to learn about God's creation.

Believing the human mind also to be the work of this Creator, he confidently pursued