

## Introduction

The 18<sup>th</sup> Century was a century of paradox. On the one hand, it was the era of the Enlightenment, or the Age of Reason, as it is sometimes called. The Enlightenment was characterised by a Europe-wide philosophical questioning (at best) and sceptical rejection (at worst) of traditional Christian faith, as incompatible with reason – or at least requiring new rational and philosophical foundations, if some version of Christianity was to be worthy of Enlightened Man's belief. On the other hand, the same century was also the era of the Evangelical Revival, as it is known in Britain, or Great Awakening, as it is known in America, in which untold myriads were brought out of spiritual darkness into the True Light. The paradox is intensified by the way that these two phenomena acted and reacted on each other. The greatest philosopher of the Enlightenment, the German 'sage of *Königsberg*', Immanuel Kant, was clearly impacted and influenced by Christianity; the greatest theologian of the Great Awakening, Jonathan Edwards, was clearly impacted and influenced by the Enlightenment.<sup>1</sup> In this opening Chapter, we shall consider the Enlightenment and its various manifestations as the necessary backdrop to any credible account of religion in the 18<sup>th</sup> Century.

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1. For Kant, see Part 3 of the present Chapter. For Jonathan Edwards, see Chapter 4, Part 2, section 3.



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## The scientific revolution and its effects

In significant ways, the Enlightenment (in German, the *Aufklärung*) grew out of the Western world's 'scientific revolution' of the 16<sup>th</sup> and 17<sup>th</sup> Centuries.<sup>1</sup> Historians have endlessly debated the origins of that revolution, and of the rise of modern science. One of the most creative thinkers about these issues, the eminent philosopher-mathematician Alfred North Whitehead (1861–1947), argued that Western science arose as a compelling and productive synthesis between (a) the devotion to reason among ancient Greek philosophers and (b) the Christian view of the universe as the creation of a wise, orderly God. This may be so, but it leaves unsettled the question of why that synthesis should have arisen with such force specifically in the 16<sup>th</sup> Century. Other historians have contended that the Protestant Reformation had a galvanizing effect on the scientific enterprise; and yet this leaves unexplained why so many of the pioneer modern scientists were Roman Catholics (such as da Vinci, Castelli, Copernicus, Descartes, Falloppio, Galileo, Garzoni, Gassendi, Kircher, Pascal, Steno, Torricelli, and others). This particular debate continues.

What we can say with some certainty is that the modern scientific enterprise in the West had its roots in the closing

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1. This is not to deny the existence of Islamic science in the Eastern world. This Chapter is concerned with the rise and consequences of Western science.

centuries of the medieval period, with trailblazers such as Robert Grosseteste (1168–1253), Roger Bacon (1214–94), Jean Buridan (1300–1358), and Nicholas of Cusa (1401–64).<sup>2</sup> However, it was in the 16<sup>th</sup> and 17<sup>th</sup> Centuries that the scientific spirit and method ignited a culture-transfiguring flame, manifested in the life and work of such revered figures in science's Hall of Fame as Leonardo da Vinci (1452–1519), Nicolaus Copernicus (1473–1543), Galileo Galilei (1564–1642), Johannes Kepler (1571–1630), Evangelista Torricelli (1608–47), and Sir Isaac Newton (1643–1726).<sup>3</sup>

As the adventure of modern science developed in the Western world, thinkers were increasingly impressed by its power to understand and manipulate nature through rational investigation. This in turn began to encourage a sense (in many minds, though not in all) that human reason was perhaps sufficient to answer *all* the meaningful questions of life. Less and less deference was paid to the established views of tradition and authority, which in scientific matters had all too often proved inadequate and defective. Famously, the ancient Greek philosopher Aristotle (384–22 B.C.) – the pre-eminent thinker of all time, in the estimation of most educated Westerners of the 16<sup>th</sup> and 17<sup>th</sup> Centuries – had provided most of the previous two millennia's science; and yet he was weighed in the new scientific balance and found sadly wanting. This generated yet another paradox: while Protestant theologians were enthroning Aristotle within theology as the supreme mentor of human thinking (after the Bible), in the new 'scholasticism' of the

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2. For Grosseteste and Bacon, see Volume 2, Chapter 7, section 3, under **Robert Grosseteste**. For Nicholas of Cusa, see Volume 2, Chapter 10, section 3.
  3. Leonardo da Vinci, although chiefly famous as an artist, pursued many scientific interests with great ability, such as geology, botany, zoology, anatomy, optics, and engineering. Copernicus and Galileo were the architects of the 'heliocentric' theory of the solar system (that the earth and the other planets orbit the sun). Kepler worked out the principles governing the patterns of planetary movement, set forth as 'the laws of planetary motion'. Torricelli invented the barometer. Newton is most celebrated for formulating the theory of gravity.

post-Luther and post-Calvin world, scientists by contrast were dethroning him as an unsafe guide.<sup>4</sup>

Two decisive examples of the intellectual revolution accomplished by the rise of science can be given here. First, there was the new astronomy. The age-old ‘geocentric’ theory of the solar system – that the universe orbited around a fixed earth – was supplanted by the new, and more effectively explanatory, ‘heliocentric’ theory – that the earth is not fixed but orbits the sun, as do the other planets. Heliocentrism was championed by Polish astronomer Copernicus and Italian astronomer Galileo. Then there was the new physics, notably although not exclusively its investigations into optics and its theory of gravity. The new physics was championed above all by the pre-eminent English scientist Isaac Newton, who became the supreme icon of science. This was captured well in some humorous lines by the 18<sup>th</sup> Century English poet Alexander Pope (1688–1744):

Nature and Nature’s laws lay hid in night;  
God said, ‘Let Newton be!’ and all was light.

Newton enjoyed his iconic status within science until the 20<sup>th</sup> Century, when he was replaced by Albert Einstein.

Rather than looking to the inherited wisdom of the past, then, the scientific endeavour taught people to think and explore nature for themselves, utilizing reason, observation, experiment. The expectation was that unceasing progress would be made to an ever more accurate understanding of the universe. As the 17<sup>th</sup> Century moved toward its close and the 18<sup>th</sup> Century got under way, this attitude slid very easily into a much more comprehensive confidence in reason to map reality in every area of existence, including beliefs about spiritual reality. If rational thinkers no longer gave uncritical deference to ancient texts written by Aristotle in the sphere of science, why should they give uncritical deference to equally ancient texts such as the Bible in the sphere of religion? As Immanuel Kant affirmed, the

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4. For the rise of the Aristotelian scholastic method in Protestant theology, see Volume 4, Chapter 1, Part 2.

watchword and war-cry of the Enlightenment was, 'Dare to use your own understanding!'

## 1. Scientific Optimism: Francis Bacon (1561–1626)

Often regarded as the first to extol the new science as offering vast positive potential for human progress, the London-born Francis Bacon (1561–1626) was an English politician who achieved high office under King James I (1603–25), as (successively) Solicitor General, Attorney General, Lord Keeper of the Great Seal, and Lord Chancellor. He was also instrumental in helping establish some of the new British Colonies on the American continent – Virginia, North and South Carolina, Newfoundland.

It is not, however, for his political career that Bacon is remembered, but as a philosopher, particularly a scientific thinker and publicist. His eloquent advocacy of scientific method – observation, gathering data, performing experiments, forming explanatory hypotheses – is found most fully and famously in his *Novum Organum* ('new method') of 1620. Bacon's treatise set out, in a wide-ranging and impactful way, the methodology of the scientific enterprise. The method is often called 'induction' (or even, in a previous generation, 'Baconian induction'). In this perspective, the 'inductive' method of observation and experiment to discover new truth is held in contrast with the 'deductive' method (where basic truths or principles are *already* known, and one simply teases out their hidden assumptions).

Yet Bacon did more than merely advocate scientific inductive method, however forcefully. He wedded this to an optimistic outlook on the benefits of science to humanity. This optimism is best seen in Bacon's novel *The New Atlantis* (1626), in which he envisages a new society flourishing on the basis of science. Bacon's fictional society has at its heart a college, Solomon's House, devoted to the scientific exploration and conquest of nature. Its purpose is described thus: 'The end [goal] of our foundation [college] is the knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible.' This entitles *The*

*New Atlantis* to be considered the first of the various scientific utopias to be imagined in fiction.

Something akin to Solomon's House, inspired directly by Bacon's writings, would come into existence in the form of Britain's 'Royal Society', officially founded in 1660 as 'The Royal Society of London for Improving Natural Knowledge'. In the Royal Society, Bacon's notion of cooperative effort toward scientific understanding and mastery of the natural universe found a real-world embodiment. The Society would stand at the forefront of British scientific endeavour in the dawning age of Enlightenment.

Bacon's unbounded optimism about human progress through science became one of the key ingredients of the 18<sup>th</sup> Century Enlightenment, although for Bacon it was not divorced from a Christian worldview. Others, however, found it easy to accomplish that divorce, replacing faith in the Christian God with faith in human reason and scientific advance.

## 2. The Autonomy of Reason: René Descartes (1596–1650)

In some ways, the philosophical father of the Enlightenment and its exaltation of human reason was the influential French Catholic thinker, René Descartes (1596–1650). The son of a lawyer from Châtellerauld in central France (although Descartes was born in nearby La Haye), and educated by Jesuits, the young philosopher trained as a lawyer, but was soon living off a private income from the sale of inherited property. He developed into a wandering scholar, eventually settling in the Dutch Republic. There was, however, intense controversy over his published ideas – the leading Dutch Reformed theologian Gisbert Voetius (1589–1676) declared an all-out intellectual war on Descartes, accusing him of being a closet atheist.<sup>5</sup> This prompted the Frenchman at last to move to Sweden, under the patronage of its young, unconventional, and pro-science queen, Christina (reigned 1644–54, then abdicated, died 1689). Descartes had never enjoyed good health, becoming a virtual vegetarian in

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5. For Voetius, see Volume 4, Chapter 2, Part 1, section 6.

pursuit of a life-enhancing diet; but the fierce Swedish winter overwhelmed him, and he died of pneumonia in 1650.

Descartes has a merited place in the development of science, through his contributions to mathematical theory (geometry and algebra) and optics, and his efforts toward formulating an overall scientific philosophy. In the realm of epistemology (the theory of knowledge), however, his legacy was more questionable. Plagued by doubts about the certainty of human knowledge, Descartes made a famous (or infamous) intellectual experiment in 1619 of subjecting to doubt everything that could possibly be doubted. Once the acid of this universal solvent of doubt had done its work, Descartes found himself left with only one certain belief – that he himself existed. The whole world of the senses, after all, might be one vast hallucination. Yet no matter how deceived he might be in his various beliefs, Descartes could at least know with certainty that he was *thinking about the things he believed* (even if his beliefs were mistaken). One cannot believe without thinking. Therefore, Descartes could be certain he was thinking. And if he was thinking, he must exist as a thinker. ‘I think, therefore I am (I exist)’ – in Latin, *cogito ergo sum*. I must exist in order to think, even if I am thinking wrongly.

Descartes’ philosophy of certainty-through-radical-doubt, expressed in his momentous *Discourse on Method* (1637), gave human reason the supreme priority in knowing truth. From the basic certainty of his own existence supplied by his own reason, Descartes then tried to prove the existence both of God and the external world (he demonstrated God, to his own satisfaction, by reviving a form of Anselm of Canterbury’s ‘ontological’ argument – God is the Perfect Being, but He would not be perfect if He lacked existence). Even so, the ‘God’ thus demonstrated by Descartes’ reason bore little resemblance to the God in whom Descartes’ religion taught him to believe, the Christian Trinity made known in Jesus Christ, the crucified and risen God-Man. Descartes had opened a pathway to a reason-constructed view of God that was only a hair’s-breadth away from the de-Christianised ‘Supreme Being’ of Enlightenment thought – the rational or natural religion of Deism.