Robert Boyle: Ireland's Eminent Scientist

Robert Boyle was born on January 25, 1627, at Lismore Castle, County Waterford, Ireland. He was the 14th child in the family of the Great Earl of Cork, a rich and prestigious landowner and friend of the king. At the age of eight, after private tuition at home, he was sent for several years to Eton, which the sons of gentlemen were just beginning to attend, and then, at the age of twelve, to the Continent.

Robert traced his conversion to December 29, 1640, when he was 13. He was studying in Switzerland at the time. One biographer described it this way: *"Awakened by a thunderstorm, the reality of God's judgment flowed into his mind. He realized … that he was not ready to face his Maker. He knew his good works were not enough: he needed salvation, and cried out to God for forgiveness."*

While Robert was still on the continent, events at home completely changed his economic situation. War, and the death of his father, left him suddenly destitute. He boarded a ship to return to London, where he had begun his travels. *"When he left (five years before) he'd enjoyed every possible advantage. His future seemed secure. He could look forward to wealth, an estate in the country … Now, five years later, [he] walked the streets of London penniless and alone."*

For a short time, Robert moved in with his sister Katherine, 13 years older, who was a widow after surviving a very unhappy arranged marriage to a churlish alcoholic. Katherine and Robert were alike in that they both loved learning. Katherine had opened her home to a group of Oxford scholars who had formed a loosely-knit science club they dubbed the "Invisible College," because it had no formal organization or meeting place. The conversation in the home was greatly stimulating to Robert. (The famous Royal Society grew out of the meetings of the so-called "Invisibles").

Robert had a thirst for knowledge, believing that *"There is no inconsistency between a man's being an industrious virtuoso, [i.e. a scientist] and a good Christian."* In the schools at the time*, "Aristotle still held sway over almost every field of natural knowledge. Education consisted largely of memorizing what authorities had said. Some schools actually prohibited original thinking. If Aristotle said a vacuum cannot exist, then that was that; memorize it and regurgitate it on the test. But early in his education, [Robert] learned to question the opinions of mere men. He … had a bright mind that asked questions, that was unsatisfied by rote answers from experts. He wanted to know how the authorities knew what they claimed, and why it was necessary to follow them. After all, who had been <u>their</u> authorities?"*

Eventually Robert was able to recover some of his father's assets and moved to a family manor in Dorset. During this period some profound works came from his pen on theology and personal Christian living, including *Style of the Scriptures, Occasional Reflections, Ethics,* and *Some Motives and Incentives to the Love of God*. Katherine distributed copies of some of these to her friends. As a result, Robert's reputation as a writer began to grow.

During his 20's, Boyle read voraciously and also tried scientific experiments, inspired by Galileo's writings and his contacts from the Invisible College. At age 27 he was invited to come to Oxford, the leading intellectual center in England at that time. This move launched his scientific career. Now with greater insight and maturity from his reading and experiments, Boyle was again in touch with the Invisible College, made up of doctors, scientists and theologians who for the most part were devout

Christians. Like the other participants, he was excited about the prospects of the "new learning" and "experimental philosophy" inspired by the works of Francis Bacon and Galileo. **Committed to the principle that science should be used not just for pride of knowing but for the good of mankind**, the College promoted experimentation on a variety of subjects: chemistry, physics, and medicine. During his six years of informal association with the Invisible College at Oxford, Boyle was largely self-taught. He did not earn a degree or professorship. Soon, however, he would be the most eminent scientist in Britain.

Eager to discover the natural laws the Creator had devised, and with financial resources sufficiently restored, Robert built a laboratory, equipped it, and hired assistants. In his experiments, his methodology was groundbreaking science, methods that set standards for empirical work that survive to this day.

Boyle set two other important precedents: he published his results in lively English, leading to the tradition of popularizing science, and he carefully described his apparatus so that others could try to reproduce the experiments, leading to the principle of repeatability. He was even brutally honest about failures and errors, feeling these were necessary parts of the learning process. All this was almost unheard of in the practice of science.

Although he had his critics (some insisting that scientific publications should be in Latin) most read his works with great eagerness. Boyle, in effect, showed that science belonged to every man, and that it had very practical effects. It led to principles that could be tested and repeated. Marie Boas Hall, in *Scientific American* (1967), said that one of Boyle's most novel creations was the idea that one could *prove* a scientific theory by experiment – an idea we now take for granted, but nearly the reverse of the Aristotelian/deductive approach to science of that day.

In his best-known experiment, Boyle poured mercury into a J-shaped tube and observed the size of the air column trapped as he added more fluid. With fastidious measurements, he discovered that doubling the pressure cut the volume in half: P = k/V, a relationship later named Boyle's Law in his honor. This was on the cutting edge of the concept that there existed "laws of nature" that were discoverable by experiment.

Well into his senior years, Boyle continued his experiments, discoveries, and publications. His achievements in chemistry, both practical and theoretical, began to steer it from the mystical and secretive arts of the alchemists, leading many historians to consider him the Father of Chemistry. Aristotle's statement "Nature abhors a vacuum" implied a kind of animistic character to the world; Boyle's approach began to steer science away from a personified nature, and view it as a machine created by God and operating according to laws.

Robert Boyle was one of the 12 charter members of a new organization founded in 1662, "The Royal Society for the Improving of Natural Knowledge." Throughout his life he was its most notable and influential fellow. Its charter was to promote the experimental philosophy for the common good. In clear contradistinction to the Aristotelians, they made their motto, *Nothing by mere authority*; in other words, all claims about nature should be subjected to the test of experiment. The founders and early members were predominantly Christians, especially Puritans. Though Boyle refused the presidency of the Royal Society because he did not believe he should, as a Christian, take an oath, he was its most

influential and esteemed member, especially at the time young Isaac Newton was just becoming a rising star. There had been academies and scientific clubs before, like the Academy of the Lynx to which Galileo belonged, but the Royal Society was the first true formal institution dedicated to experimental science, and its *Philosophical Transactions* is the longest-running scientific journal in the world.

In those first decades, the Royal Society was blessed by the virtuous Christian testimony and reasoned faith of Robert Boyle. His integrity was impeccable. Throughout his life, Boyle was humble, gracious, prayerful, and peace-loving. He was conscientious to a fault, even stopping to pause respectfully before mentioning the name of God. He was adamantly intolerant of swearing. He was a strong supporter of foreign missions and for years he contributed liberally to the expenses of translating the Bible or portions of it into various languages. Boyle believed that the Bible should be available in the vernacular language of the people (in contrast to the Latin-only policy of the Roman Catholic Church at the time). Although an Irish language version of the New Testament had been published in 1602 it was rare in Boyle's adult life. In 1680—1685 Boyle personally financed the printing of the Bible, both Old and New Testaments, in Irish. From 1661, he was governor of the Society for the Propagation of the Gospel in New England. He often aided "The Apostle to the Indians," John Elliot, who wrote to Boyle, his English sponsor, on August 29, 1686: *"I am old, ready to be gone, and desire to leave as many books as I can."*

His zeal for spreading the good news of Jesus Christ was matched by his zeal against atheism. To him, science never rated even a close second to Christian faith in importance. He said, *"For I, that had much rather have men not philosophers than not Christians, should be better content to see you ignore the mysteries of nature, than deny the Author of it."*

In his will, he established a fund for a series of eight lectures, to be given once a year, for the defense of the historic Christian faith against atheism, and the demonstration of the superior reasonableness of Biblical Christianity against any philosophy or arguments of critics and skeptics. The "Boyle Lectures," as they came to be known, continued for many years. They were revived by Dr Michael Byrne in 2004 at St. Mary-le-Bow church in London. They take place annually in February.

Robert Boyle is a pillar of modern science and one of its most eminent practitioners. He died from paralysis on December 31, 1691, in London, and was buried in the churchyard of St Martin-in-the-Fields. In his will he had written: *"First and chiefly, I commend my soul to Almighty God, my Creator, with full confidence of the pardon of all my sins in and through the merits and mediation of my alone Savior, Jesus Christ."*

It is possible that in school you heard about the Boyle Lectures – Lectures he endowed for the furtherance of Christianity. More than likely you learned about Boyle's Law – that the pressure of a given mass of an ideal gas is inversely proportional to its volume at a constant temperature. But were you ever told about Boyle's legacy – a profound heritage of rich literature explaining the Christian foundation for science? In his opinion, the motivation for scientific research was this:

From a knowledge of His work, we shall know ***Him***.

"When with bold telescopes I survey the old and newly discovered stars and planets that adorn the upper region of the world, and when with excellent microscopes I discern, in otherwise invisible objects, the inimitable subtlety of nature's curious workmanship; and when in a word, by the help of anatomical knives, and the light of chemical furnaces, I study the book of nature … I find myself oftentimes reduced to exclaim with the Psalmist,

'How manifold are Thy works. O Lord! In wisdom hast Thou made them all!'"