Dictionary of Early Modern Europe: entry on Isaac Newton (1642-1727)

Early life and education

Newton, Isaac (1642-1727), natural philosopher, lay theologian, administrator. Isaac Newton was born on Christmas Day 1642 (O.S.) in the tiny Lincolnshire hamlet of Woolsthorpe. Named after a father who died before his birth, at the age of three Isaac lost his widowed mother Hannah who left Woolsthorpe to marry an elderly clergyman. He would not live under the same roof as his mother until she returned with three additional children in 1653 after being widowed a second time. Two years later, Newton was sent to the King's School in nearby Grantham. Although he received little instruction in mathematics, Newton benefited from a thorough preparation in the classics and the Bible. Described later by the daughter of the apothecary with whom he lodged at Grantham as "a sober, silent, thinking lad", he eventually emerged as the top-ranked student of his class. Nevertheless, Newton's mother took him from the grammar school at fifteen so he could begin to fulfil his duties as lord of Woolsthorpe manor. After proving almost worthless as a farmer, Hannah reluctantly gave in to the admonishments of her son's schoolmaster and sent him back to the King's School to prepare for university. In June 1661, a year after the Restoration, Newton matriculated at Trinity College, Cambridge.

Cambridge student, fellow and professor

Having enrolled as a sizar, Newton was required to serve and wait on scholars of higher status. He still found ample time to devour the undergraduate curriculum, which focussed on Plato and Aristotle and such traditional disciplines as logic, rhetoric and chronology. But Newton did not long stay detained with the Medieval curriculum and was increasingly drawn to the thought of the new mechanical philosophy, adding, among others, Copernicus, Galileo, Descartes and Robert Boyle to his academic fare. By the time he took his BA in the spring of 1665 he was poised to make his own contributions to the new philosophy. The plague that swept through Cambridge that summer brought academic life at the Fenland university to a standstill. But for Newton, after returning home to Woolsthorpe, the pace of his intellectual journey only quickened. While at Woolsthorpe Newton finished his development of calculus, thus providing a new and effective tool for mathematicians to work out problems relating to curves and rates of change. He also carried out refraction experiments with prisms that confirmed the heterogeneous nature of light. A second Newtonian icon also came from this period. As an elderly man, Newton recalled that on one summer evening at Woolsthorpe during the plague he saw the falling apple that would provide a crucial clue to his understanding of universal gravitation. It was also around this time that Newton took up a serious interest in the secret arts of alchemy. He remained in the domestic sphere for almost two years, a period often referred to as Newton's *anni mirabiles*. Shortly after his return to Cambridge in the spring of 1667, he was made a fellow of Trinity College. In following year he received his MA. In 1669 the twenty-six-year-old Newton was elected Lucasian Professor of Mathematics, after Isaac Barrow, who recognized Newton's great talents in this discipline, resigned in the latter's favour. The same year, after acquiring two furnaces, some chemicals and the alchemical manual *Theatrum chemicum*, he initiated his quest for the Philosophers' Stone.

Optics, controversy and theology

It was not long before Newton's innovations came to the notice of the wider intellectual world. The Royal Society of London had learned that Newton had constructed the first working reflecting

telescope. When Barrow brought a specially-made copy of this telescope to a Society meeting in late 1671, it was an immediate sensation. Encouraged by this success, Newton sent a paper on his optical discoveries to the Society's secretary Henry Oldenburg. This now-celebrated paper on colours graced the pages of the *Philosophical Transactions of the Royal Society* in 1672. But Newton soon found himself embroiled in a controversy when the Royal Society's Robert Hooke made his scepticism known and continental readers complained that they could not replicate the paper's experiments. Around the time this controversy was driving Newton back into the safely of the cloisters of Cambridge, Newton commenced a more dangerous revolution.

As one of the requirements of his Trinity fellowship, Newton was obligated to take holy orders by 1675. This may help explain the sudden explosion of theological studies in the early 1670s. Whether or not the pending ordination deadline was a factor, Newton's thorough research of early Church doctrine and history led him to conclude that the doctrine of the Trinity was not a part of the primitive Christian faith. As an antitrinitarian heretic Newton could not become an Anglican clergyman in good faith. Expressing the reasons for this was out of the question and he had resolved to resign his fellowship quietly when a special dispensation came in 1675 from Charles II permitting Lucasian Professors to retain their College fellowships without ordination.

Newton's most important theological discovery was that the Bible taught that only the Father was God in an absolute sense. Christ, although not "very God" in the Nicene formulation, was nevertheless central to Newton's eschatology and view of the atonement. Although a precise categorization of his beliefs would be artificial, it can be said that he arrived at a Christology similar to Arianism. Newton concluded that the Athanasian or homoousian party of the fourth-century had corrupted the Church by imposing on it the Trinity—a doctrine Newton believed to be post-biblical and inspired by Greek metaphysics. Denial of the Trinity was illegal in Newton's day and for a long time afterwards. Thus, for more than half a century, he confined his heresy to the private sphere even while outwardly conforming to the Anglican Church. Newton's theological explorations were not limited to doctrine. Taking one of his leads from the Cambridge prophetic exegete Joseph Mede, Newton adopted a premillenarian eschatology, writing his first manuscript treatise on the Apocalypse in the 1670s. Even in his prophetic views Newton differed from the mainstream. Although retaining the standard Protestant opinion that the Whore of Revelation was the Roman Church, Newton added as the chief sin of the Catholics the introduction of the Trinitarian dogma, thus bringing his heresy and prophetic interpretation together.

The *Principia*

Newton devoted much of his fourth decade to studying biblical doctrine, taking notes on church history, analyzing the early creeds, studying the Book of Revelation and carefully writing out the results of his research on enough manuscript sheets to fill several large books. Additionally, a large portion of this time was spent copying out alchemical recipes and working feverishly over his furnaces as he sought the secrets of chemical and metallic matter. He also fulfilled the duties of his mathematics professorship. Newton's penetrating mind was once again drawn to natural philosophy in earnest when, during the summer of 1684, Edmond Halley came to Cambridge to ask him if he could provide a mathematical explanation for the elliptical orbits of planets. This elicited out of Newton later that year a short manuscript bearing the title *De motu corporum in gyrum* (*Concerning the motion of revolving bodies*). But this was just the beginning. For close to two years, Newton refined and expanded the inchoate physics of *De motu*. Important to this refinement was his and Halley's work on the comets of 1680 and 1682, which demonstrated both that comets move in close,

albeit highly parabolic orbits, and that Descartes' system of fluid planetary vortices was untenable. Newton worked out his laws of motion and a theory of universal gravitation that dissolved the traditional distinction between celestial and terrestrial physics. The final result was published in the *Philosophiae naturalis principia mathematica* (*Mathematical principles of natural philosophy*), its title an apt description of its contents. Although it was retained by some in France until the 1740s, Cartesian physics was immediately rendered obsolete.

Those few mathematicians who could understand this virtually impenetrable book recognized its revolutionary nature at once. Fewer still understood that its author was powerfully motivated by the Renaissance *topos* of the *prisca sapientia* and was convinced he was recovering knowledge lost by the ancients rather than discovering secrets that Nature had never before yielded to humanity. This helps explain why Newton hid much of his analysis behind a classical façade of geometry. Nor was there more than an oblique hint here and there of the work's theological substratum. Not only were Newton's influential notions of absolute space and time underpinned by his conceptions of God's omnipresence and eternal duration, but Newton believed the *Principia* contained within its pages an armoury of testimonies to natural theology. As he wrote to Richard Bentley in late 1692, "When I wrote my treatise about our Systeme I had an eye upon such Principles as might work wth considering men for the beleife of a Deity & nothing can rejoyce me more then to find it usefull for that purpose".

With the *Principia* in print and beginning to draw praise and near worship for its contents, Newton redirected his attention to theology. In the late 1680s and early 1690s he produced a lengthy commentary on Revelation, an attack on Athanasius and his "Theologiae gentilis origines philosophicae", an exploration of the original Noachic religion and the roots of idolatry. Perhaps emboldened by the success of his work on mathematical physics, in 1690 he sent his friend John Locke a work of antitrinitarian textual criticism entitled "Two notable corruptions" for anonymous publication on the continent, and only suppressed the publication at the last moment. The post-*Principia* period also brought the commencement of Newton's public life, which was signalled by his public opposition in 1687 to the attempt of James II to force the University of Cambridge to grant a degree to a Catholic priest and his election as university MP in 1689, shortly after the Glorious Revolution. By the early 1690s, Newton was also looking for a way to move on from Cambridge.

London: the Mint and the Royal Society

Newton's opportunity came in 1696 with the Wardenship of the Royal Mint in London. As Warden he was charged with bringing "coiners" to justice. Having already traced doctrinal corruption in church history, textual forgery in the Bible and the corruption of natural philosophy, Newton exerted the same zeal and energy in the pursuit of counterfeiters. In 1699 he was promoted to the position of Master. He retained this post for the rest of his life, demonstrating considerable talents as an administrator as he led the Mint efficiently through a recoinage.

More honours came his way. In 1703 he was elected President of the Royal Society, a position he also kept until his death. Once at the helm, Newton reinvigorated the stagnating experimental program at the Society. Queen Anne knighted Newton at Cambridge in 1705. A year before this Newton published his *Opticks*. Unlike his *Principia*, this work was written in English and contained a heavy experimental focus. The appended Queries, which grew in number in later editions, proposed questions about the nature of heat, light and the ether, as well as the forces responsible for attraction and repulsion, thereby laying out a research agenda for many years to come. A Latin edition of the *Opticks* was prepared by the Newtonian Samuel Clarke and published in 1706.

His work on the calculus (fluxions) was edited by William Jones and appeared as *De analysi per æquationes* in 1711.

Newton's increasing fame and status, along with his further entrenchment in the British establishment, led to rising confidence and occasional displays of hubris. Having been first painted as late as 1689, in the early eighteenth century Newton sat for portraits with growing regularity. He also became entangled in a dispute over priority in the discovery of calculus with Leibniz, doing himself little honour in the process. He also fired volleys at the philosophies of Leibniz and Descartes in the General Scholium he added to the second edition of the *Principia* in 1713. The theologically-astute recognized in this same appendix an encoded attack on the Trinity. More apparent in this appendix was Newton's advocacy of the design argument, espousal of induction in natural philosophy and his attack on vain hypothesizing. Shortly after this, the Newtonian Samuel Clarke represented Newton's views in a literary debate with Leibniz on the nature of natural philosophy and providence.

Although he almost completely left alchemy behind when he departed Cambridge, Newton's theological studies continued unabated. His overall theological system, which included believers' baptism, mortalism and a denial of a literal devil finds close parallels in the thought of continental Radical Reforming movements such as the Anabaptists and the Polish Brethren. His religious ethos was similar to English Non-Conformity. Spiritually, Newton also felt close to the primitive Church and his uncompromising monotheism reveals a strong Hebraic strain.

His millenarianism and commitment to a prophetic outlook shows the stamp of his puritan roots. As he grew older, he set the time of the end, which he believed would see the fall of the corrupt Church, the preaching of the original Gospel, the return of the Jews to Israel, the Second Coming, the battle of Armageddon, further and further into the future. One rough date he set for these events, and the future peaceful reign of the saints on earth, was 2060 A.D. As death neared, he laboured to complete his work on chronology. When death came on 20 March 1727, Newton shocked his nephew-in-law John Conduitt by refusing the last sacrament of the Anglican Church. In this act, he finally broke with the corrupt Church within which he has so uneasily communed and found his peace with God.

Legacies and constructions

In stark contrast to the humble funeral of his father some eighty-five years before, Newton was given a state funeral, his body borne by nobles with great pageantry to the pantheon of British greatness, Westminster Abbey in London. A young Voltaire was among the mourners and was incredulous that a natural philosopher could be so honoured. Within a few short years, Voltaire would make some of the first contributions to the Enlightenment conception of Newton as a secular saint of the Age of Reason.

Newton's literary remains helped fuel image-making on both sides of the English Channel. There appeared after his death the *Chronology of ancient kingdoms amended* (1728), the *System of the world* (1728), an English translation of the *Principia* and the *System of the world* (1729), the fourth edition of the English *Opticks* (1730), the *Observations upon the prophecies of Daniel and the Apocalypse of St. John* (1733) and the *Method of fluxions and infinite series* (1736). To these works by the master were added a plethora of popular texts by Newton's disciples rendering Newton's philosophy easy for the masses.

Partly because Newton hid his alchemy and heretical theology from the prying eyes of the public and partly due to the remaking of Newton by Enlightenment apologists, most still know

Newton primarily as a great, perhaps the greatest, scientist. More than two and a half centuries after his death, with his private manuscripts available for scrutiny, scholars are revealing a mind that seemingly knew few limits, moving freely through the fields of mathematics, natural philosophy, alchemy, history and theology in a career befitting a child of the seventeenth century.

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