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THE RELIGION OF ISAAC NEWTON

The Frennoble Lectures 1973



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prophecy, and in framing conjectures about the world to come. My commentary on Newton's commentary on the Apocalypse follows an old exegetical tradition, and I trust that the catena will yet be prolonged.

In the body of the text Newton's obvious mis-spellings and inadequacies of punctuation have been silently corrected. The appendixes are faithful renderings of the manuscripts with all their idiosyncrasies. Words and phrases crossed out by Newton have been placed in angle brackets.

Finally, I should like to dedicate this *libellus* to the Master and Fellows of Balliol College, among whom I lived as Eastman Visiting Professor to Oxford University in 1972-3. Lecturing in the great hall of Balliol, with the portraits of austere past Masters peering over my shoulder, to an audience stiffly ranged on backless wooden benches was an unforgettable experience. But the presence of John Wyclif in a far corner gave me comfort.

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HIS FATHER IN HEAVEN

THAT the task of searching into the religion of Isaac Newton should fall to a historian rather than a theologian may require an apology. Fortunately I discovered one among Newton's manuscripts. In a treatise on the language of Scripture he remarked on the similarity between the historian's method of periodization and the system of chapters in the books of prophecy. 'For if Historians', he wrote, 'divide their histories into Sections, Chapters, and Books at such periods of time where the less, greater, and ~~greater~~ revolutions begin or end; and to do otherwise would be improper: much more ought we to suppose that the holy Ghost observes this rule accurately in his prophetick dictates since they are no other then histories of things to come.'¹ In an area where the Holy Ghost operates according to the prescribed historical canon, we historians are on familiar ground and need not fear to tread. Since it will be one of the contentions of these lectures that Newton's was a historical and a scriptural religion, that the metaphysical disputations in which he was sometimes enmeshed ranked quite low in his esteem, a historian might be as good an expositor as a philosopher or a theologian. Newton's scriptural religion was of course not a dry one; it was charged with emotion as intense as the effusions of mystics who seek direct communion with God through spiritual exercises and illumination—a path to religious knowledge that for Newton was far too facile and subjective to be true.

Newton's printed religious views have exerted no profound influence on mankind, and I doubt whether the witness of his manuscripts, upon which I hope to draw, will contribute

¹ Jerusalem, Jewish National and University Library, Yahuda MS. r. 1, fol. 16r. See Appendix A below, p. 122.

anything to a religious revival. In the eighteenth and nineteenth centuries Newton was occasionally cited by English apologists to illustrate the compatibility of science and faith. If the greatest of all scientists was a believer, ran the argument, how could any ordinary mortal have the impudence to doubt? German theologians of the Enlightenment leaned heavily upon Newton's confession of belief in a personal God in the General Scholium to the *Principia*, and Albrecht von Haller, the paragon of science in the Germanic world of his day, reverently quoted Newton as authority to support his own reconciliation of science and religion.² There are even a few recorded instances of conversion inspired by Newton's *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John*. Johann Georg Hamann, the great Magus of the North, who chanced upon the book in London in the 1750s, testified to his sudden enlightenment upon reading it.³ More recently, Aleksandr Solzhenitsyn, in spiritual combat with his government, resurrected Newton as an ally: one of the characters in the *First Circle* defends the sincerity of Newton's belief in God and refutes Marx's allegation that Newton was a covert materialist. But it must be admitted from the outset that an interest in Newton's religion can hardly be justified by its power as an instrument for the propagation of faith. His scientific discoveries and what Newtonians made of them, not his own religious utterances, helped to transform the religious outlook of the West—and in a way that would have mortified him. My dedication to the man himself and to his reputedly esoteric religious writings rests on the assumption that everything about him is worthy of study in its own right, for he remains one of those baffling prodigies of nature that arouse our curiosity and continue to intrigue us by virtue of their very existence.

Isaac the son of Isaac, a yeoman, was born prematurely on Christmas Day of 1642, and was baptized in the small ancient church of Colsterworth, Lincolnshire, on 1 January.

² Albrecht von Haller, *Briefe über die wichtigsten Wahrheiten der Offenbarung* (Bern, 1772), p. 6.

³ Johann Georg Hamann, 'Betrachtungen über Newtons Abhandlung von den Weissagungen', *Sämtliche Werke*, ed. Josef Nadler, i (Vienna, 1949), 315–19, and 'Tagebuch eines Christen', op. cit. 9.

Some eighty-five years later Sir Isaac Newton, Master of the Mint and President of the Royal Society, was borne to his grave in Westminster Abbey by great lords of the realm and eminent prelates who were his friends. The country boy's strict Church of England religion of 1661, when he first went up to Cambridge, as centred round the Bible as any Dissenter's, as repelled by Papists and enthusiasts as any young Englishman's of the Restoration, is still discernible in the latitudinarian religion of the aged autocrat of science who received French Catholic *abbés*, a notorious Socinian, High-Churchmen, and, thanks to his last illness, just missed a confrontation with Beelzebub himself in the person of an importunate visiting Frenchman named Voltaire. But between the womb and the tomb Newton underwent a great variety of religious experiences. As he strove mightily to acquire a knowledge of his God and to ward off evil, different kinds of religious concerns were successively in the forefront of his consciousness. Nor was he immune to shifting winds of theological doctrine. Over the decades the Church to which he belonged suffered many vicissitudes. In the course of a series of dynastic changes it was bereft of its head, restored, imperilled, established, and more firmly established; its prevailing temper (if not the articles of faith) was modified. In Augustan Anglicanism, undergoing a subtle movement towards a moralist and rationalistic religion, the sacrificial and redemptive quality of Christ was sometimes left by the wayside. Open theological controversies and reports of private conversations among clergymen of all ranks in the hierarchy of the Church of England convey the impression that by the early eighteenth century this Church was suffering what present day popularizers would call an identity crisis: the labels Arminian, Arian, Socinian, Unitarian were banded about and all manner of secret heterodoxies were tolerated behind a stolid verbal façade, which often betokened indifference.

In examining the religion of the man Isaac Newton, one could investigate the measure of outward conformity of this member of the Anglican Church to those rituals minimally required by his communion. When and how often did he go

to church and take the sacrament? Did he genuflect? The record holds no great surprises. He occasionally skipped chapel as an undergrad in Cambridge; and during the height of his feverish creativity, his amanuensis Humphrey Newton (no relation) tells us that Newton was so absorbed with his 'indefatigable studies' that he 'scarcely knew the house of prayer'.⁴ There exists an attestation of his receiving the sacrament of the Last Supper before he went up to London to become Warden of the Mint in 1696.⁵ He paid for the distribution of Bibles among the poor,⁶ and sharply censured any expressions of levity in matters of religion voiced in his presence. Late in life he was a member of a commission to build fifty new churches in the London area. John Conduitt, who married Newton's niece, was somewhat dismayed that Newton on his death-bed had failed to ask for the final rites, but he consoled himself with the reflection that Newton's whole life had been a preparation for another state.⁷

In one critical incident relating to the fortunes of the Anglican Communion under the Restoration, Newton took an uncompromising—one might almost say defiant—public stand. In the Father Alban Francis case, he pushed his more reluctant Cambridge colleagues to ignore an order under James II's sign-manual instructing them to admit a Benedictine monk to the degree of Master of Arts without taking the oath of loyalty to the Established Church. Newton and other members of the University ended up before the Court of High Commission for Inspecting Ecclesiastical Affairs under the redoubtable George, Lord Jeffreys, who fired the Vice-Chancellor and intimidated the rest of them with a menacing 'Go your way and sin no more lest a worse thing befall you'.⁸

⁴ David Brewster, *Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton* (Edinburgh, 1855), ii, 94.

⁵ Royal Commission on Historical Manuscripts, *Eighth Report*, Pt. 1 (London, 1881), 61, official certificate of the vicar and churchwarden of St. Botolph's Church, Cambridge, 18 Aug. 1695.

⁶ Oxford, Bodleian Library, New College MSS. 36r, II, fol. 39r.

⁷ Cambridge, King's College Library, Keynes MS. 130.

⁸ T. B. Howell, compiler, *A Complete Collection of State Trials* (London, 1816), xi, 1315-40.

To be sure, when Newton lived in London, many of his chosen disciples and most intimate friends were suspect in matters of religion. Edmond Halley and David Gregory were reputed to be unbelievers; John Locke's views on Christianity were severely censured by the orthodox; the beloved Nicolas Fatio de Duillier was condemned to stand in the pillory for acting as secretary to the Huguenot prophets from the Cévennes who were proclaiming the imminent destruction of London in a bloody holocaust; William Whiston, whom Newton had chosen as his successor to the Lucasian Chair, was ejected from Cambridge University for flagrant heresy and he continued to raise tumults in London churches; Hopton Haynes, Newton's close aid at the Mint for thirty years, was, his writings indicate, a theological humanitarian; Dr. Samuel Clarke, Newton's mouthpiece in the correspondence with Leibniz, was formally charged with spreading antitrinitarian doctrine by the lower house of the Anglican clergy, though the case was quashed by the bishops after a humiliating retraction on Clarke's part. Newton's latter-day irenics even extended far enough to embrace a wildly heterodox Balliol man: James Stirling, a Snell Exhibitioner, a brilliant mathematician and a Jacobite, who had got into trouble for refusing to take an oath to George I, was one of the last of his protégés.

Although the list of deviationists of every kind from the recognized Establishment who were Newton's sometime favourites is rather long, guilt by association was not invoked, and during Newton's lifetime nobody cast aspersions on his Anglican orthodoxy. Never did he join his friends in any public manifesto on matters of doctrine, and when Fatio became entangled in the thickets of activist millenarianism, Whiston of outright Arrianism, he pushed them away. In the privacy of his chamber Newton seems to have thought that the Anglican clergymen among whom he dwelt and prospered were not a bad lot after all. While compiling notes on the gross immorality of churchmen in the age of Constantine, he digressed into a comparative study of the clergy in various ages: 'And whilst I compare these times with our own it makes me like our own the better and honour our Clergy the

more, accounting them not only men of better morals but also far more judicious and knowing. 'Tis the nature of man to admire least what he is most acquainted with: and this makes us always think our own times the worst. Men are not sainted till their vices be forgotten.'

Overt actions and private testimonials of this kind will not preoccupy us overmuch. In public Newton was a reasonable conformist and, so far as I know, it did not occur to him to break with his communion. As for the motives and feelings that underlay his conduct—that, as David Hume would say, is 'exposed to some more difficulty'.

How can one recapture the religious experience of a man who died almost 250 years ago? What can I really know about my neighbour's God?

If for the moment we narrow the horizon and play the positivist, we have two kinds of evidence about Newton's inward religion: those sentiments that he actually published during his lifetime or voiced to reliable witnesses orally and in correspondence; and those manuscripts on religion—more than a million words—that were never printed, nor even intended for publication, but that allow a historian to make inferences about Newton's religious sensibility. Direct expressions of religious emotion are sparse—he was not effusive with intimate revelations. He wrote no autobiography, no *Pensées*; he left no map of Christian experience with technical terms and categories such as seventeenth-century English Puritans and German Pietists drew. But there are occasional documents both public and private that record outbursts of religious passion whose authenticity is compelling. And he had a plan of salvation uniquely his own. Despite the refractory nature of the materials, with the aid of these papers one may be able to catch a reflection of his actual religious emotion.

Customarily, Newton's religion has been examined in rationalistic terms, framed propositions setting forth what he did and did not believe in matters of theological doctrine or what he thought about God's relation to the physical universe, about time and about space. In an atmosphere heavy with

⁹ Yahuda MS. 18. 1, fol. 3^r.

verbose disputation and pretensions to learning, self-aware men like Isaac Newton felt called upon to make explicit their religious position, if only for themselves, to differentiate their beliefs about Christ and the creed from those of other sects and persuasions in the Christian community of Western Europe and from dominant tendencies within their own Anglican Church. Such propositions are largely embedded in polemical writings that Newton directed against opinions he held to be dangerous to the true faith, and they serve as a form of self-definition by negation. But while these dogmatic assertions concern us, they hardly exhaust the content of his religion. And perhaps enough has already been said on the puerile question of whether or not Newton actually implied that space was the sensorium of God.

Finally, if Newton's faith be turned on every side, the relationship of his religion to his work as a scientist may be uncovered. What religious implications did he himself draw from his scientific discoveries? And then a question that is less frequently posed: What effect did his scientific method have on his mode of inquiry into matters of religion? While it is self-evident that Newton was born into a scientific world at a given stage of its development, it may sometimes be forgotten that he was also born into a European religious world which for more than half a century had been grappling with the problem of how to assimilate the growing body of scientific knowledge and that, in England at least, a fairly stable rhetoric governing the relationships between the new science and religion had been evolved. Newton could alter the rhetoric, amend it in fact while adhering to it in principle, but he could never completely escape it.

Were we confined in our considerations of Newton's religion within the boundaries of the widely known printed documents that have been chewed and re-chewed *ad nauseam*—queries 20 and 23 in the 1706 Latin edition of the *Optics*, the prefaces and scholia to the later editions of the *Principia*, and the Clarke-Leibniz correspondence—Newton's religion might appear rather stereotyped. In 1729, shortly after his death, the rejected disciple William Whiston assembled in a little pamphlet everything that Newton had in fact

published on religion under his own name, and it ran to a paltry thirty-one small pages.¹⁰ Fortunately, there is that vast manuscript legacy that may now allow us to breathe new life into these bones.

Most of Newton's manuscripts on religion were long concealed from the world's notice. Of the major non-scientific works now in print, only one, the *Chronology of Ancient Kingdoms Amended*, was prepared for the press by Newton himself. The *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John* was put together after Newton's death by his nephew Benjamin Smith, a cleric not renowned for his piety, a dilettante who had hobnobbed with artists in Paris and Rome and was not very sympathetic to this kind of literature, a man interested in making some money out of his late uncle's papers. In the plan worked out from a heap of manuscripts, the Reverend Mr. Smith favoured the blandest, most conventional, and most commonsensical materials, ignoring the more imaginative excursions. What he sent to the press in 1733 is only an insignificant selection from the vast archive at his disposal. And for two hundred years thereafter most of the manuscripts were suppressed, bowdlerized, neglected, or sequestered, lest what were believed to be shady lucubrations tarnish the image of the perfect scientific genius.

In the Sotheby sale of the Portsmouth Collection in 1936, Newton's non-scientific manuscripts were strewn about rather haphazardly. But since that date, the bulk of them have been reassembled and are now in safe keeping, thanks to the zeal of three ingenious collectors, a most improbable trio, a renowned British economist, an American stock-market analyst, and an orientalist born in the Middle East who ended up at Yale: special collections in Cambridge, England, Wellesley, Massachusetts, and Jerusalem now bear the names of Keynes, Babson, and Yahuda respectively. Isolated papers still turn up occasionally in American universities and private collections, and there are documents from the Royal Mint (in the Public Record Office) in which

¹⁰ William Whiston, *Sir Isaac Newton's Corollaries from his Philosophy and Chronology in his own Words* (London, 1729).

accounts of the coinage are interspersed with reflections on the Gnostics and the Gabbala, but they do not materially alter conclusions based on the major repositories. For the first time since the great dispersion, virtually everything that Newton wrote on religion is freely available.

There are extant four separate commentaries on Daniel and the Apocalypse, a church history complete in multiple versions, rules for reading the language of the prophets, many drafts of an Irenicum, a treatise 'De Annis Praedictionis Christi', and extensive notes on Christian heresies through the ages—all this in addition to hundreds of pages of excerpts from contemporary works of scholarly divinity, from Latin translations of the Talmud, and from the writings of the Church Fathers, to say nothing of a commonplace book devoted mainly to theological subjects and papers in the Cambridge University Library that appear to be related to Samuel Clarke's replies to Leibniz. If Newton was Puritan in his devotion to the text of the Bible he was Anglican in his acceptance of the witness of those Fathers of the Church who were closest to the apostolic tradition, and he spent years scrutinizing their testimony. Manuscripts that are now labelled 'chronology' and even some of those called 'philosophical alchemy' were detached from the theological manuscripts proper by nineteenth-century cataloguers. There were no such rubrics and compartmentalizations in Newton's mind, and wherever possible I shall try to reknit connections among them.

The Keynes collection in King's College includes seven autograph drafts of Newton's 'Irenicum, or Ecclesiastical Polity tending to Peace', a draft of 'A Short Scheme of True Religion', a reasonably complete version of a commentary on the Apocalypse in nine chapters, and an attack on Athanasius entitled 'Paradoxical Questions Concerning the Morals and Actions of Athanasius and his Followers'—most of these published with varying degrees of accuracy by David Brewster in 1855 and by Herbert McLachlan in 1950.¹¹ The

¹¹ Herbert McLachlan, ed., *Sir Isaac Newton: Theological Manuscripts* (Liverpool, 1950). See also A. N. L. Munby, 'The Keynes Collection of the Works of Sir Isaac Newton in King's College, Cambridge', *Notes and Records of the Royal Society of London*, x (1952), 40-50.

Babson Institute Library in Wellesley, Massachusetts, has a text of a treatise on the Temple of Solomon complete with an architectural sketch, collections of stray notes, and sundry pieces on church history. By far the greatest part, however, of the historical-theological manuscripts, the church histories, the works on pagan religion, commentaries on prophecy, and long discussions of the nature of Christ, is in the Jewish National and University Library in Jerusalem. The manuscripts on chronology and different versions of the 'Historical Account of Two Notable Corruptions of Scripture' are largely divided between the New College manuscripts in the Bodleian Library and the Yahuda manuscripts in Jerusalem.

After Newton's death, his friend John Craig, prebendary of Salisbury, author of the indigestible *Theologiae Christianae Principia Mathematica* (1699), maintained in a letter to John Conduitt that Newton 'was much more solicitous in his inquiries into Religion than into Natural Philosophy'. And in what appears to be the record of a confidence, Craig went on to give Newton's official explanation for not publishing these writings during his lifetime: 'They showed that his thoughts were some times different from those which are commonly received, which would ingage him in disputes, and this was a thing which he avoided as much as possible.'¹² The historian cannot of course completely silence the protesting shades of Francis Hall, Hooke, Flamsteed, Leibniz, the Bernoullis, Fréret, Conti, and other victims of Newton's thunderbolts. But Craig may have had a point. For Newton, religious controversy was a source of great anxiety, and remained in a separate category.

Whether or not to put any of his theological papers into print was a subject about which Newton vacillated throughout his life. In one famous instance in 1690, letters exposing as false the Trinitarian proof-texts in John and Timothy had been transmitted through Locke to Le Clerc for anonymous publication in Holland, but then had been withdrawn in panic. And yet, though Newton in his old age committed

¹² Keynes MS. 132, letter of 7 April 1727; published in part in Sotheby and Co., *Catalogue of the Newton Papers sold by order of the Viscount Lynnington* (London, 1936), pp. 56-7.

numerous documents to the flames, he spared these letters and scores of other theological manuscripts. Many are finished pieces that had been revised time and again; some had been recopied as if they were being readied for the press. Introductions addressed 'to the reader' in a manner that for Newton is extraordinarily ingratiating have been attached. At times these manuscripts are distinguished by a freshness and ease of expression that are rare in Newton's published works; he even lapses into colloquialisms. Many reflections scattered throughout these papers are transparently autobiographical and are among the most revealing sources for an understanding of his religion. In a history of the growth of the great apostasy within the Church, he derided the Eastern monks in terms that reveal his psychological acumen in analysing religious experience:

I find it was general complaint among them that upon their entering into the profession of a Monastick life they found themselves more tempted in the flesh then before and those who became stricker professors thereof and on that account went by degrees further into the wilderness then others did, complained most of all of temptations. The reason they gave of it was that the devil tempted them most who were most enemies and fought most against him: but the true reason was partly that the desire was inflamed by prohibition of lawful marriage, and partly that the profession of chastity and daily fasting on that account put them perpetually in mind of what they strove against, and their idle lives gave liberty to their thoughts to follow their inclinations. The way to chastity is not to struggle with incontinent thoughts but to avert the thoughts by some employment, or by reading, or by meditating on other things, or by convers. By immoderate fasting the body is also put out of its due temper and for want of sleep the fancy is invigorated about what ever it sets it self upon and by degrees inclines towards a delirium in so much that those Monks who fasted most arrived to a state of seeing apparitions of women and other shapes and of hearing their voices in such a lively manner as made them often think the visions true apparitions of the Devil tempting them to lust. Thus while we pray that God would not lead us into temptation these men ran themselves headlong into it.¹³

¹³ Yahuda MS. 18. 1, fol. 2v.

In writing about the lives of the monks, Newton did not merely copy mechanically from ecclesiastical histories or from descriptions in the Church Fathers; he relived their experience, disclosing his own personal psychotherapeutic techniques for combating temptation. The remedy he proposed for such onslaughts of the devil as they suffered was a potion he had often mixed for himself. It was the idle, self-indulgent, day-dreaming of the monks, their neglect of the study of God's actions in the world, that led them into vice and the fabrication of superstitions. This is not a Weberian exposition of the work ethic, nor a Voltairian attack on the emptiness of contemplation, but Newton freely confessing to his own regimen for keeping the demons of lust at bay. Fighting off the threat of evil thoughts with constant labour in search of the specific knowledge of God's word and God's works was the panacea.

Even a cursory study of Newton's manuscripts excludes any bifurcation of his life into a robust youth and manhood, when he performed experiments, adhered to rigorous scientific method, and wrote the *Principia*, and a dotage during which he wove mystical fantasies and occupied himself with the Book of Daniel and the Apocalypse of St. John—a legend first propagated by the French astronomer Jean-Baptiste Biot in the early nineteenth century. Some of the livelier versions of Newton's commentaries on prophecy should be dated to the 1670s and 1680s, when he was in his prime. His studies of world chronology and philosophical alchemy, both linked to his theology, began early in his Cambridge University years and continued until his death. A critical edition of the whole manuscript hoard that his executor Thomas Pellet dismissed as 'loose and foul papers' must await a future generation of scholars prepared to wrestle with ten or more variations of the same text and to establish their filiation with authoritative precision; but a rough and tentative chronological order is even now possible, and what I have to say is based on that sequence.

The first intimate religious text of Newton's that has survived, written in 1662 in Shelton shorthand when he was almost twenty and at the University, is perplexing in many

respects. It is a confession of his sins, forty-nine before Whit Sunday and nine afterwards. To write out one's sins in private prior to partaking of the Eucharist was common enough. But if one categorizes the sins that Newton listed, most of them turn out to be trivial acts of Sabbath-breaking, or worldly thoughts, or minor disobedience to his mother and grandmother, apparently insignificant aggressions against his schoolfellows and one against his sister, a few instances of lying and petty cheating. This profusion of peccadilloes can be likened to the snowing under of the priest in auricular confession with a barrage of venial sins in order to cover the really grievous one, or to the manner in which the associations of a psychoanalytic patient can become a veritable flood in which the most painful and crucial ones are drowned.

And there are in fact a few serious self-accusations in the mound of petty infractions that Newton assembled: a wish to burn his mother and stepfather and their house over them; a desire for self-slaughter; and unclean thoughts and dreams. But the anguish of the suicidal despair is masked by a laconic statement that takes up less room than a confession of bawling on the Sabbath or surreptitiously using his roommate's towel. As I read and re-read this document, I cannot sustain any presumption of a convulsive religious crisis at the age of twenty—nothing like Robert Boyle's vision in a Geneva thunderstorm. There are, however, a series of eight or nine sins describing Newton's fear of alienation from God in terse but moving phrases that define his religious state: 'Not turning nearer to Thee for my affections. Not living according to my belief. Not loving Thee for Thy self. Not loving Thee for Thy goodness to us. Not desiring Thy ordinances. Not long[ing] for Thee . . . Not fearing Thee so as not to offend Thee. Fearing man above Thee.'¹⁴

Newton's copy-books, which were not meant to serve as direct a religious purpose as the shorthand confession, are pervaded by a sense of guilt and by doubt and self-denigration. The scrupulosity, punitiveness, austerity, discipline,

¹⁴ Richard S. Westfall, 'Short-Writing and the State of Newton's Conscience, 662 (1)', *Notes and Records of the Royal Society of London*, xviii (1963), 14.

and industriousness of a morality that may be called puritanical for want of a better word were early stamped upon his character. He had a built-in censor and lived ever under the Taskmaster's eye. The Decalogue he had learned in childhood became an unrelenting conscience that made deadly sins of lying, coveting, Sabbath-breaking, egotistic ambition, and prohibited any expressions of hostility or any breach of control. Newton took the Biblical injunctions in deadly earnest. His God was a *dominus deus, παντοκράτωρ, Imperator universalis*, a Master who had issued commandments, and it was his duty as a servant to obey them. From the beginning to the end of his life, Newton's was a religion of obedience to commandments, in which the mercies of Christ the Redeemer played a recessive role. By the turn of the century, the prevailing spirit in the Anglican Church was far less austere and demanding than Newton's personal religion. Sermons soothed self-satisfied parishioners with rationalist reassurances that their faith did not require too much of them, that its burdens were not oppressive. By contrast, the commandments that lie at the heart of the public confession of faith of the seventy-one-year-old Newton in the General Scholium to the *Principia*, composed more than half a century after his youthful confession of 1662, were exacting and had been borne with pain throughout his life. When Berkeley, Hartsoker, and Leibniz were advertising the irreligious implications of Newton's system with an array of fancy metaphysical arguments, Newton proclaimed his belief in a personal God of commandments with plain words that harked back to the primitive sources of Judaic and Christian religion. William Whiston's translation from the third edition of the *Principia*, incorporating phrases from the second edition, preserves the stark quality of the original far better than the more commonly quoted English versions:

This Being governs all Things, not as a *Soul of the World*, but as *Lord of the Universe*; and upon Account of his Dominion, he is sitled *Lord God*, supreme over all. For the Word *God* is a relative Term, and has Reference to Servants, and *Deity* is the Dominion of God not (*such as a Soul has*) over a Body of his own, which is the Notion of those, who make God the Soul of the World; but (*such*

as a *Governor has*) over Servants. The supreme God is an eternal, infinite, absolutely perfect Being: But a Being, how perfect soever without Dominion is not *Lord God*. For we say, *my God, your God, the God of Israel, the God of Gods, and Lord of Lords*. But we do not say, *my Eternal, your Eternal, the Eternal of Israel, the Eternal of the Gods*: We do not say, *my Infinite, (your Infinite, the Infinite of Israel)*: We do not say, *my Perfect, (your Perfect, the Perfect of Israel)*: For these Terms have no Relation to Servants. The Term *God* very frequently signifies *Lord*; but every *Lord* is not *God*. The Dominion of a spiritual Being constitutes him *God*. True Dominion, *true God*: Supreme Dominion, *supreme God*: Imaginary Dominion, *imaginary God*. And from his having *true Dominion* it follows, that the *true God* is *living, intelligent, and powerful*; from his *other* Perfections it follows that he is *supreme or most perfect*.¹⁵

This is the testament of a believer who feels deeply the power of a personal, not a metaphysical, god. A *dominus* has been bearing upon him.

In patriarchal religions like Judaism and Christianity, there is a ritual identification of God and Father. Newton was a posthumous child; when he was born his father had been two months dead. The fantasy world of the posthumus has been explored in twentieth-century literature and in clinical practice. While this proves nothing about Isaac Newton in particular, it does cast light on the imagination and emotional experience of some children born after a father's death and on their search for him throughout their lives. In the folklore of many peoples there is a belief that a posthumus is endowed with curative powers. A number of years ago the minister of the little church in Colsterworth where Newton was baptized told me that country folk in the area still clung to the notion that a posthumus was destined to outstanding good fortune. A similar prognostic attaches to those born on Christmas Day, and Newton's first biographer, Dr. William Stukeley, commented on this traditional omen of his hero's future greatness.

Though all children are curious about their origins, the emotions that surround their questioning have different

¹⁵ Whiston, *Newton's Corollaries*, pp. 13-15.

degrees of intensity. Leafing through the New College manuscripts in the Bodleian that trace the genealogies of pagan gods euhemeristically interpreted and of royal dynasties through the ages, and the ancestries of heroes—all of which were duly integrated into Newton's historical and chronological studies—one is overwhelmed by his pre-occupation with origins. It has been suggested in recent studies that a passionate quest for the historical genesis of families and kingdoms and civilizations may be related to an anguished desire to recover lost parents; but such analogies will not convince the mockers, and are not meant to.

When Newton was being knighted, he had to present a genealogy to the College of Heralds. The number of extant copies in his own hand—in Jerusalem, in Wellesley, Massachusetts, in Cambridge, in Austin, Texas, and who knows where else—testifies to the anxiety that accompanied the preparation of this document. In the Jerusalem genealogy, he fixed his parents' marriage in 1639, when it is a matter of record that it took place in 1642, seven months before he was born. Perhaps he worried about his legitimacy. He knew neither father nor father's father, except by report; they were dead before he entered the world. Like other abandoned children—and that is the proper definition of his psychic state—he concocted strange ancestors for himself, even a remote lordly one. The mystery of the father and his origins was not dispelled by the submission of an official document to the College of Heralds, and the search continued on different psychic levels throughout his life. Newton had an especially poignant feeling about the Father who was in heaven, a longing to know Him, to be looked upon with grace by Him, to obey and to serve Him. The sense of owing to progenitors is deep-rooted in mankind, and a child has various ways of attempting to requite the debt; but the demands of a father whose face has never been seen are undefinable, insatiable. Since Newton's father was unknown to him and the child Isaac had not received the slightest sign of his affection, he could never be certain that he had pleased or appeased the Almighty Lord with whom this father was assimilated.

For Isaac Newton, theological questions were invested with personal feelings that had their roots in the earliest experiences of childhood. There was a true father and a false father, as there were true and false gods. The Reverend Barnabas Smith, whom Newton was obliged to call father and who was not his real father but his stepfather, who had carried off his mother when he was about three to live with her in a nearby parish and to sire a half-brother and two half-sisters, was the prototype of the false father and of all religious deceivers and idolaters and metaphysical falsifiers, against whom Newton inveighed with great violence. Newton would show himself to be a master of the traditional tools of scriptural exegesis as developed by the rabbis of the Talmud, Church Fathers, medieval commentators, and Protestant divines—this is the learned side of his religious studies, and I hope that I shall neither neglect nor underestimate them; but he also left behind imprints of the search for the true father who had never set eyes upon him.

That Newton was conscious of his special bond to God and that he conceived of himself as the man destined to unveil the ultimate truth about God's creation does not appear in so many words in anything he wrote. But peculiar traces of this inner conviction crop up in unexpected ways. More than once Newton used *Jeova sanctus unus* as an anagram for Isaacus Neuttonus.¹⁶ In a manuscript interleaf in Newton's own copy of the second edition of the *Principia* a parallel between himself and God is set forth in consecutive lines: 'One and the same am I throughout life in all the organs of the senses; one and the same is God always and everywhere.'¹⁷ (In the third edition, the *Ego* gives place to an *omnis homo*.) The downgrading of Christ in Newton's theology, which I shall discuss in a later lecture, makes room for himself as a substitute. Another Isaac had once been saved by direct divine intervention, and in patristic literature Isaac

¹⁶ See Keynes MS. 13; *Solihby Catalogue*, p. 2, lot 2; H. R. Luard *et al.*, *A Catalogue of the Portsmouth Collection of Books and Papers by or belonging to Sir Isaac Newton* (Cambridge, 1888), p. 17.

¹⁷ Newton, *Philosophiæ naturalis principia mathematica*, 3rd edn. in facsimile with variant readings, ed. A. Koyré and I. B. Cohen (Cambridge, Mass., 1972), ii. 762.

was a prefiguration of Christ. Alexander Pope may not have been aware how pithily his fluent couplet expressed Newton's own sense of his intimate relationship to God. The revelation of 'nature and nature's laws' to mankind required Providence to perform a new act of creation: 'God said: let Newton be!' Since the fullness of knowledge had been revealed through him, his election by God had been empirically demonstrated. It is true that Newton left queries for a future scientist in the *Optics*, and in one manuscript he concedes that even his reading of prophecy is subject to some further perfection of detail.¹⁸ But essentially there was not much left to be disclosed after Newton, either in science or in the interpretation of Scripture or in the fixing of the definitive chronological pattern of world history or in prophecy.

Perhaps for sceptics Newton's passionate yearning to know God's actions is not better understood when we translate it into a longing to know the father whom he had never seen. But that he belongs to the tribe of God-seekers who, feeling they have been appointed through a divine act for a unique mission, live ever in the presence of an exigent God to whom they owe personal service in grateful obedience is borne out not only by the public confession in the second edition of the *Principia* in 1713, but by numerous digressions in manuscripts dealing with church history and dogma, which anticipate *almost verbatim* this more famous epilogue, especially in their attack on excessive emphasis on the abstract attributes of God, in their rejection of metaphysics, and in their exaltation of God as Master.

In defending his system of the world against Leibniz and his followers, who charged him with belittling the omniscience and omnipotence of God, I doubt whether Newton simply scurried to his pile of theological manuscripts and lifted from them religious rhetoric appropriate for the occasion. While I do not wholly exclude this possibility, I am more inclined to believe that these were formulas he had repeated to himself over and over again as all great obsessives do, and that they came to mind spontaneously when he felt obliged to write a religious apologia. And it is precisely their

¹⁸ Yahuda MS. 1. 1, fol. 15^r. See Appendix A below, p. 121.

reiteration in so many other contexts in the manuscripts that elevates the final affirmations of the General Scholium above the level of a *pièce de circonstance* merely incident to his tragicomic battle with Leibniz. In a fragment entitled 'Of the faith which was once delivered to the Saints', Newton wrote:

If God be called δ παντοκράτωρ the omnipotent, they take it in a metaphysical sense for Gods power of creating all things out of nothing whereas it is meant principally of his universal irresistible monarchical power to teach us obedience. For in the Creed after the words I believe in one God the father almighty are added the words creator of heaven and earth as not included in the former. If the father or son be called *God*, they take the name in a metaphysical sense as if it signified Gods metaphysical perfections of infinite eternal omniscient omnipotent whereas it relates only to Gods dominion to teach us obedience. The word *God* is relative and signifies the same thing with Lord and King; but in a higher degree. As we say my Lord, our Lord, your Lord, the King of Kings, and Lord of Lords, the supreme Lord, the Lord of the earth, the servants of the Lord, serve other Lords, so we say my God, our God, your God, the God of Gods, the supreme God, the God of the earth, the servants of God, serve other Gods: but we do not say my infinite, our infinite, your infinite, the infinite of infinities, the infinite of the earth, the servants of the infinite, serve other infinities. When the Apostle told the Gentiles that the Gods which they worshipped were not Gods, he did not mean that they were not infinities, (for the Gentiles did not take them to be such;) but he meant they they had no power and dominion over man. They were fals Gods; not fals infinities, but vanities falsly supposed to have power and dominion over man.¹⁹

A moving presentation of Newton's feeling for his God, in a totally different setting, a manuscript commentary on 2 Kings 17: 15, 16, might serve as a pendant to the emphasis in the General Scholium on God's dominion and will and on His actions, not His attributes or essence.

To celebrate God for his eternity, immensity, omniscience, and omnipotence is indeed very pious and the duty of every creature to do it according to capacity, but yet this part of God's glory as it almost transcends the comprehension of man so it springs not

¹⁹ Yahuda MS. 1. 5, fols. 96^v, 97^r, 98^r.

from the freedom of God's will but the necessity of his nature . . . the wisest of beings required of us to be celebrated not so much for his essence as for his actions, the creating, preserving, and governing of all things according to his good will and pleasure. The wisdom, power, goodness, and justice which he always exerts in his actions are his glory which he stands so much upon, and is so jealous of . . . even to the least title.²⁰

In another passage of the manuscript church history he continued the attack on any metaphysical definitions of God:

For the word God relates not to the metaphysical nature of God but to his dominion. It is a relative word and has relation to us as the servants of God. It is a word of the same signification with Lord and King, but in a higher degree. For as we say my Lord, our Lord, your Lord, other Lords, the King of Kings, the Lord of Lords, other Lords, the servants of the Lord, serve other Lords, so we say my God, our God, your God, other Gods, the God of Gods, the servants of God, serve other Gods.²¹

To be constantly engaged in studying and probing into God's actions was true worship and the fulfillment of the commandments of a Master. No mystical contemplation, no laying himself open to the assaults of devilish fantasies. The literature on the psychopathology of religious fanaticism was extensive in the seventeenth century and Newton accepted its basic tenets without knowing its name. Working in God's vineyard staved off evil, and work meant investigating real things in nature and in Scripture, not fabricating metaphysical systems and abstractions, not indulging in the 'vaine babblings and oppositions of science falsely so called'.²² If God is our Master He wants servants who work and obey.

Newton could not establish relations with his God through a feeling of His love, either directly or through an intermediary. Neither love, nor grace, nor mercy plays an important role in Newton's religious writings. Only two paths are open to him in his search for knowledge of the will of God as Master: the study of His actions in the physical world, His creations, and the study of the verbal record of

²⁰ Yahuda MS. 21, fol. 1^r.

²¹ Yahuda MS. 15-7, fol. 154^r.

²² Yahuda MS. 15-5, fol. 79^r.

His commandments in Scripture, both of which have an objective historical existence. We do not know the reason why God's will manifested itself in the physical world in one way rather than in another, why He issued one commandment rather than another; all we can know is the fact that He did, and we can marvel at the consequences and study them.

The more Newton's theological and alchemical, chronological and mythological work is examined as a whole corpus, set by the side of his science, the more apparent it becomes that in his moments of grandeur he saw himself as the last of the interpreters of God's will in actions, living on the eve of the fulfillment of the times. In his generation he was the vehicle of God's eternal truth, for by using new mathematical notations and an experimental method he combined the knowledge of the priest-scientists of the earliest nations, of Israel's prophets, of the Greek mathematicians, and of the medieval alchemists. From him nothing had been withheld. Newton's frequent insistence that he was part of an ancient tradition, a rediscoverer rather than an innovator, is susceptible to a variety of interpretations.²³ In manuscript scholia to the *Principia* that date from the end of the seventeenth century he expounded his belief that a whole line of ancient philosophers had held to the atomic theory of matter, a conception of the void, the universality of gravitational force, and even the inverse square law. In part this was euhemeristic interpretation of myth—many of the Greek gods and demigods were really scientists; in historical terms, it was a survival of a major *topos* of the Renaissance tradition of knowledge and its veneration for the wisdom of antiquity. But the doctrine may also take us back to the aetiology of Newton's most profound religious emotions, with which we began. He was so terrified by the *hubris* of discovery of which he was possessed that, as if to placate God the Father, he assured his intimates and himself that he had broken no prohibitions against revealing what was hidden in nature, that he had merely uttered in another language what the ancients had known before him.

²³ See J. E. McGuire and P. M. Rattansi, 'Newton and the "Pipes of Pan"', *Notes and Records of the Royal Society of London*, xxi (1966), 108-43.

feel better
To believe that one had penetrated the ultimate secrets of God's universe and to doubt it, to be the Messiah and to wonder about one's anointedness, is the fate of prophets. Newton's conviction that he was a chosen one of God, miraculously preserved, was accompanied by the terror that he would be found unworthy and would provoke the wrath of God his Father. This made one of the great geniuses of the world also one of its great sufferers.

II

GOD'S WORD AND GOD'S WORKS

GOD'S WORD AND GOD'S WORKS

NEWTON'S theological manuscripts that are now housed in Jerusalem were once shown to Albert Einstein. Despite the fact that it was September 1940 and he was already involved himself with an apocalyptic enterprise,¹ he took the trouble to compose a letter praising the papers for the insight they afforded into Newton's *geistige Werkstatt*, his 'spiritual workshop'.² On the other hand, George Sarton, that prodigious innovator in the history of science, expressed cool indifference. He declared that as a scientist he personally was no more concerned with Newton's non-mathematical works than a medical man would be with the rabbinical books of Maimonides.³ Such polar responses to Newton's theological writings may have more than passing historical interest, for they raise again in a naive, anecdotal form awesome questions that began to emerge in the halcyon years of the scientific revolution: Can there be an autonomous realm of human knowledge that lives by its own law? Is it possible to encapsulate activities known as science in the mind of the scientist and to keep them free and independent, unshackled by deep passions and transcendent longings?

In the seventeenth century men who were rationalist and articulate about the relations of science and religion, either what they were or what they should be, tended to move in one of two directions. Those who inclined towards developing the idea of the neutrality, or separateness, or autonomy, of science took a position that came to be epitomized in the

¹ In the summer of 1939 Einstein had signed a letter on the 'military danger from fission of uranium' that led to President Roosevelt's setting up an Advisory Committee on Uranium; see Margaret Gowing, *Britain and Atomic Energy, 1939-1945* (London, 1964), p. 34.

² Yahuda MS. Var., Albert Einstein to A. S. Yahuda.

³ Yahuda MS. Var., A. S. Yahuda to Nathan Isaacs, 23 Mar. 1941, quoting a conversation with George Sarton.

metaphor of the two books, the Book of Scripture and the Book of Nature, both created by God as manifestations of His omnipotence and omniscience, but books different in character that had better be kept apart. There was scriptural sanction for reading nature like a book, for the Psalmist sang of unfolding the scroll of the heavens. The metaphor of the two books was common to the trumpeters of the new philosophy Bacon and Campanella and to the embattled geniuses Kepler and Galileo. At the end of the century it was still implicit in Newton's admonition that 'religion and Philosophy are to be preserved distinct. We are not to introduce divine revelations into Philosophy, nor philosophical opinions into religion'.⁴ Separate but equal, by the side of the word of God Kepler saw the finger of God, Galileo the hand, and Newton the arm, an anthropomorphic progression whose significance I have not yet fathomed.

There were others who headed in a different direction—towards the achievement of a new, organic, Christian synthesis of science and religion that would replace the old scholastic union of Christian belief and pagan Aristotelian philosophy. To describe this movement of thought, in which the two books were to be interleaved with one another, or amalgamated into one world-outlook, a term popularized by Comenius in the 1640s, Pansophia, might be applied, though this lost cause of the age antedated Comenius and did not receive its ultimate embodiment until Leibniz. Firtation with the language of Rosicrucian theosophy was not infrequent among the Pansophists.

Nominally Newton belonged to the former company, the separatists, and he rejected the Pansophists. His actual practice, however, is a far more complex matter.

Traditional societies require a rhetoric for the assimilation of novelities, and seventeenth-century science had inherited many of the arguments used in the defence of pagan philosophy in its relation to faith. But the new experimental science by its very nature was more pretentious and more aggressive. Harmonizing Scriptures with a frozen Greek or

⁴ Keynes MS. 6, fol. 1^r, printed in McLachlan, *Newton's Theological Manuscripts*, p. 58.

Latin text was one thing; it was something else entirely to accommodate Scriptures with the discoveries of scientists alive and kicking, often rumbustious like Kepler and Galileo, men who had a keen sense of their unique mission. On the Continent the problem was not only the harmony of science and theology on an abstract level, for which a new guide to the perplexed might conceivably have been composed, but the coexistence of scientists and theologians, the entrenched old corps looking with a jaundiced eye upon the new corps coming into being under a variety of titles—*astrologus*, *philosophus*, *mathematicus*—and slowly but surely affirming its identity, even before it had acquired a collective name.

The reception of science was rendered more problematical not only by incessant controversy among the major denominations of post-Reformation Christianity, which tended to harden and solidify orthodoxies and put them on guard against the slightest breach in their ramparts, but also by an anxious vigilance among the various religious establishments that was bred by disquieting innovations in the interpretation of the Bible. The scientific revolution of the seventeenth century is for us so decisive that it tends to overshadow the simultaneous upheaval in Christian and Jewish scriptural studies. Along with the new reading of the Book of Nature, audacious ventures were taking place in the interpretation of Scripture at the hands of learned Christian Hebraists like John Selden, Vossius father and son, Johannes Buxtorf, John Lightfoot, Edward Pocock, John Spencer, who might be considered relatively orthodox in their historical researches, and more suspect scholars like Thomas Hobbes, Baruch Spinoza, Richard Simon, Jean Le Clerc. And to them I would sometimes join the unrevealed Newton. While heterodox Biblical interpretations did not suffer the same kind of notoriety as the new science because they were often published anonymously, they were perhaps no less unsettling in their effects. Since the meanings of both books—the Book of Nature and the Book of Scripture—were open to question, a stable relationship between them became even more elusive.

Among all the formulations of the metaphor of the two

books in the seventeenth century, a passage in Francis Bacon's *Advancement of Learning* was the *locus classicus* for the image in the English-speaking world, official doctrine for British scientists and their Royal Society when his works reached the height of their popularity:

Let no man upon a weak conceit of sobriety or an ill-applied moderation think or maintain, that a man can search too far, or be too well studied in the book of God's word, or in the book of God's works, divinity or philosophy; but rather let men endeavour an endless progress or proficience in both; only let men beware that they apply both to charity, and not to swelling; to use, and not to ostentation; and again, that they do not unwisely mingle or confound these learnings together.⁵

His key warning was against confounding the Learnings together, and in a formal way the Royal Society heeded the counsel: no one ever presented a public case for a scientific fact with a theological argument. John Wallis recollected the early decision of one group, before the corporate body was established, to be absorbed exclusively with the 'New Philosophy . . . precluding matters of Theology and State Affairs'.⁶ When Newton was President of the Society, the journal-books record, he banned anything remotely touching on religion, even apologetics. Since many of the English mathematicians, physicists, astronomers, and naturalists earned their keep as divines with livings or as university scholars in orders, they were able to follow the Baconian advice in all its parts; they studied both books diligently while making a show of keeping their inquiries separate, and seemed to don different caps for each of their occupations. One has only to mention John Wilkins, Seth Ward, Isaac Barrow, John Wallis, John Ray, John Flamsteed, who had taken orders, and Boyle and Newton who had not but who led the same kind of double lives. English scientists *qua* scientists kept out of the sacristy, English theologians *qua* theologians kept out of the rooms where experiments were

⁵ Francis Bacon, *The Advancement of Learning and New Atlantis* (London, 1951), p. 11 (The First Book, 1. 3).

⁶ Thomas Hearne, *Works* (London, 1810), iii. cxi-cxiv, John Wallis to Thomas Smith, 29 Jan. 1697.

performed. In England, the official adoption of the metaphor of the two books had allayed earlier spiritual qualms about the pursuit of physical science as a deflection from divinity.

By Newton's day the fear of actual persecution for scientific activities had passed in England, though the history of harassment on the Continent was very much alive in the consciousness of the scientists. Newton had read the *Dialogues* of Galileo in the Salusbury translation of 1661 in a volume of collected papers that also contained the heroic apologies for science by Kepler and Galileo as well as justifications by a number of theologians who had defended the Copernican hypothesis earlier in the century. John Wilkins's pre-Civil War popularizations of science, familiar to Newton when he was still a youth, had similarly defended the new science as not contradictory to Scripture. Reviewing his long life, the aged Newton was grateful for his good fortune in having been born an Englishman 'in a land of liberty where he could speak his mind—not afraid of Inquisition as Galileo'; he told John Conduitt (who reverently jotted down each phrase in a notebook), 'not obliged as Des Cartes was to go into a strange country and to say he proved transubstantiation by his philosophy'.⁷ English scientists were still punished occasionally for heterodox religious opinions—they might be denied professorships—but not for their scientific doctrines. Under Newton's hegemony science took to policing itself in matters of religion in order to avoid scandals, as William Whiston insinuated when Newton kept him out of the Royal Society for proclaiming his anti-trinitarianism in public. In general, the metaphor of the two books served a reasonable political purpose for the advancement of science—it was a *modus vivendi*.

In the first edition of the *Principia* in 1687, Newton mentioned the name of God only once, in a passing phrase, as if by chance—'Thus God arranged the planets at different distances from the sun'⁸—for he did not remotely think it necessary or relevant to the proofs, nor did he imagine that anyone would raise a question about his orthodoxy. In England there was no serious attack on science from any

⁷ Keynes MS. 130.

⁸ Newton, *Principia* (London, 1687), p. 415.

religious or secular authority, unless you inflate the importance of men like Henry Stubbs and a few silly attempts with politico-religious overtones on the part of crackpot and perhaps venal antagonists of the Royal Society to implicate that august body in a supposed Spanish plot to turn England over to the Pope.

Galileo and Kepler had always stressed how different were the languages of God in which the two books were written: one, the Book of Nature, was mathematical and veiled, its meaning hard to come by, open only to the learned; the other, the Book of Scripture, was plain everyday speech. And they dropped more than occasional hints that in the eyes of God the inquirer into the arcana of nature was manifestly superior to the mere Scripture interpreter. Galileo's quip, which he attributes to an 'eminent ecclesiastic', that the Holy Ghost teaches how to go to heaven, not how the heavens go;⁹ Kepler's advice to the benighted Bible expositor who knew no astronomy: 'Him I advise to go home and manure his fields'¹⁰—these were characteristic of their defiant conception of the relations of the two books. Neither Galileo nor Kepler had been willing to keep out of the sacristy, as they had been cautioned by friendly theologians of their respective persuasions. If theologians needed help with understanding planetary references in the Bible, Galileo counselled them to turn to specialists in astronomy. Since Galileo had been a novice at the monastery of Vallombrosa near Florence and Kepler a student of theology at Tübingen, they considered themselves more knowing than the run of theologians even in interpreting Scripture, a presumption for which they paid dearly. In the England of the Restoration, however, thirty years after Galileo's trial, the spiritual atmosphere in which scientists conducted their operations was quite different; where so many divines doubled as scientists, the coexistence in one head of expert knowledge in both books came to be respected, and the

⁹ Galileo, 'Letter to the Grand Duchess Christina', in *Discoveries and Opinions*, tr. Stillman Drake (New York, 1957), p. 186.

¹⁰ Johannes Kepler, *Nova Astronomia*, in *Gesammelte Werke*, ed. Max Caspar (Munich, 1937), iii, 33.

capacity of a man to reveal the glory of God in both spheres was taken for granted. Frenchmen like Father Marin Mersenne are Continental counterparts, but nowhere is there anything resembling the English concentration of impressive scientist-theologians.

On socio-economic grounds, the acceptance of science in England was overdetermined. Rhetorically—and the changing patterns of the vindication of science over the centuries are not yet sufficiently explored—science was integrated into the life of the literate English upper classes through a baroque elaboration of a theology of glory, arguments backed up by profuse illustrations of the marvellous design, beauty, harmony, and order of nature as revealed by scientific inquiry. Once again Bacon was a canonical source: '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, as if we should judge or construe of the store of some excellent jeweller, by that only which is set out toward the street in his shop.'¹¹ The true gloria required a search for hidden causes.

Bacon's formulation of the scientific gloria had been renewed at regular intervals throughout the century, perhaps most eloquently by Thomas Browne:

The World was made to be inhabited by Beasts but studied and contemplated by Man; 'tis the Debt of our Reason we owe unto God, and the homage we pay for not being Beasts. . . . The Wisdom of God receives small honour from those vulgar Heads that rudely stare about, and with a gross rusticity admire His works: those highly magnifie Him, whose judicious inquiry into His Acts, and deliberate research into His Creatures, return the duty of a devout and learned admiration.¹²

The traditional use of science as a form of praise to the Father assumed new dimensions under the tutelage of Robert Boyle and his fellow-members of the Royal Society, and among the immediate disciples of Isaac Newton. In the

¹¹ Bacon, *Advancement of Learning*, pp. 49–50 (The First Book, VI, 16).

¹² Thomas Browne, *Religio Medici* (London, 1643), p. 28.

Christian Virtuoso, demonstrating that experimental philosophy assisted a man to be a good Christian, Boyle assured his readers that God required not a slight survey, but a diligent and skilful scrutiny of His works. Only one practised in anatomy and optics, who 'takes asunder the several coats, humours, and muscles, of which that exquisite dioptrical instrument [the eye] consists . . . shall discover, by the help of the laws of optics, how admirably this little organ is fitted to receive the incident beams of light, and dispose them in the best manner possible for completing the lively representation of the almost infinitely various objects of sight'.¹³

For Galileo, the study of astronomy had been by far the most appropriate glorification of God because of the *grandezza* and *nobilità* of the subject; Englishmen extended the arguments from design and the wonderment from the astronomical world to the zoological, the botanical, and the chemical. They even turned to the microscopic world as one of equal dignity. John Ray and Francis Willughby saw God in flora and fauna, Robert Hooke in the hair of a cheese-mite, Boyle in the arrangement of corpuscles. Henry More's works were a veritable catalogue of teleologies, with all aspects of creation—animal, vegetable, and mineral—showing a plan and refuting Epicurean atheism. In 1692 Richard Bentley made a compendium of these arguments and crowned them with the Newtonian system; in 1704 and 1705 Samuel Clarke repeated the litany in a more philosophical mode. During the first decades of the eighteenth century the glorias of the Boyle Lectures reached unprecedented levels of banality. In a *Physico-Theology, or a Demonstration of the Being and Attributes of God from his Works of Creation* (delivered in 1711–12 and published the next year) Newton's friend William Derham confessed that he may have slighted the creatures of the waters, and he apologized for the perfunctoriness of the evidence of true religion he had marshalled from vegetables, but otherwise he was satisfied with the completeness of his coverage. By the terms of the endowment, all these lecture-sermons were fighting Epicurean atheism, Hobbism,

¹³ Robert Boyle, *The Christian Virtuoso*, in *Works*, newly ed. T. Birch (London 1772), v. 517.

Spinozism. These were bogies that in fact hardly existed; but the parade of examples served to entrench science in the establishment as a handmaiden of religion.

Works by Craig, Whiston, George Cheyne, Derham, the lectures of Bentley and Clarke, advertised the superiority of Newton's system of the world as a religious apology above all other forms of gloria. Newton's attitude towards their demonstrations has been treated as unambiguously favourable, and surely the political and human Newton was not indifferent to their implicit flattery. But in particulars he was often very critical of these performances. Bentley's exposition of the Newtonian system was in many respects far from his liking; Cheyne's *Philosophical Principles of Religion: Natural and Revealed* (1715), which established a new-found principle of 'Reunion with God', analogous in the system of intelligent beings to the principle of attraction in the material universe, was too saturated with religious Neoplatonism for his taste; Newton prepared what he called 'castigations' of Derham's *Physico-Theology*; and there was no room in Newton's interpretation of prophecy for Craig's mathematized Christian theology, his computation of the time of the Second Coming of Christ based on a statistical theory of the slow attenuation of the witness of the apostles. Samuel Clarke in his own Boyle lectures bestowed a modern metaphysical *cachet* on arguments from design as hoary as Galen and Cicero; but, warn though their personal relations were, Newton was not always completely happy with Clarke's philosophical formulations—witness the caveats Newton instructed Pierre Des Maizeaux to introduce when the Clarke–Leibniz correspondence was reprinted.¹⁴ The argument from design

¹⁴ See Cambridge, University Library, Add. MS. 3965, fol. 289r, Draft D, for an 'Avertissement au lecteur' sent by Newton to Pierre Des Maizeaux to accompany his publication of the Clarke letters: 'Nor is existence the quality of any thing but the existence of the thing with its Qualities. But as the Hebrews called God **QDQ** *place* and the Apostle tells us that he is not far from any of us for in him we live and move and have our Being, putting *place* by a figure for him that is in all place; and as the scriptures generally speak of God by allusions and figures for want of proper language: so in these Letters the words *Quality* and *Property* were used only by a figure to signify the boundless extent of Gods existence with respect to his ubiquity and eternity, and that to exist in this manner is proper to him alone' (printed in A. Koyré and I. B. Cohen, 'Newton

demonstrated in the concatenation of planetary movements, in the paths of comets, even in the symmetry of animal parts, was repeated by Newton in general terms, but the outpouring of detail and the multiplication of conjectures among his disciples often made him uneasy. They bordered too closely on presumptions of a knowledge of God's intent in minutiae, where the evidence was flimsy. In the end, the only evidence of design that was overpowering and unassailable came from the mathematical principles of natural philosophy themselves—and he told Derham as much. As far back as December 1691, in a conversation with David Gregory, Newton had expressed a similar opinion that 'a good design of a publick speech . . . may be to shew that the most simple laws of nature are observed in the structure of a great part of the Universe, that the philosophy ought ther to begin, and that Cosmical Qualities are as much easier as they are more Universal than particular ones, and the general contrivance simpler than that of Animals plants etc'.¹⁵

Towards the close of the seventeenth century in England, scientific apologetics sometimes ran amuck, virtually obliterating the distinction between the two books. Continental scientists had been on the defensive, fighting off the intrusions of theologians into their private preserve. Galileo and Kepler had based their fundamental arguments on an ancient dictum of scriptural interpretation by the Talmudic rabbis, passed down through the Church Fathers: 'The Bible speaks in the language of everyman.' This, it was hoped, freed science from the fetters of any literal exegesis of Genesis and other Biblical texts that vaguely alluded to planetary movements, since the mathematical language of astronomy patently could not be read into the plain words of Scripture. Kepler had had the psychological insight to surmise that even after the universal triumph of the heliocentric principle, we as ordinary persons would continue in

¹⁵ Newton, *Correspondence*, iii (Cambridge, 1961), 191, Memoranda by David Gregory, 28 Dec. 1691.

everyday speech to talk, in accordance with our sense of sight, of the rising and setting of the sun.¹⁶ But scholars in Newton's circle, in their eagerness to demonstrate the consonance of the two books, embarked upon mammoth adventures in conciliation that eroded the wall between science and Scripture. They evolved what came to be known as a *physica sacra*, a study of the history of creation as presented in Genesis and in the works of Newton, showing line by line the perfect harmony between them. The Book of Nature and the Book of Scripture were made congruent in every last detail. There was a scientific explanation of the flood, and the whole future history of the earth was outlined with scientific precision. In Thomas Burnet's *Telluris Theoria Sacra* the final end in a great conflagration entailed the solution of such tricky technical problems as how a solid mass of rock could be burned. Commenting on Burnet's book in January 1681, Newton offered 'by way of conjecture' a view of how the planets might have been arranged by God in an initial act of creation and their motion steadily accelerated until the desired tempo for their co-ordinated movements had been reached.¹⁷ Soon William Whiston, with Newton's seeming consent, outdid Burnet and wrote *A New Theory of the Earth* proving that 'The Mosaic Creation is not a Nice and Philosophical account of the Origin of All Things, but an Historical and True Representation of the formation of our single Earth out of a confused Chaos, and of the successive and visible changes thereof each day, till it became the habitation of Mankind'.¹⁸ The 'postulata' that Whiston set down would have been completely acceptable to his patron, to the *summo viro Isaaco Newton* to whom it was dedicated:

I. The obvious or Literal Sense of Scriptures is the True and Real one, where no evident Reason can be given to the contrary. II. That which is clearly accountable in a natural way, is not

¹⁶ Kepler, *Nova Astronomia*, pp. 28-9.

¹⁷ Newton, *Correspondence*, ii (1960), 329-34.

¹⁸ William Whiston, *A New Theory of the Earth* (London, 1696), p. 3. In *A Collection of Authentick Records Belonging to the Old and New Testament* (London, 1727-8), Pt. 2, Appendix IX, p. 1071, Whiston reported that Newton had influenced him in his opposition to the 'Allegorical or Double Interpretation of the Prophecies of the Old Testament'.

without reason to be ascribed to a Miraculous Power. III. What ancient Tradition asserts of the constitution of Nature, or of the Origin and Primitive States of the World, is to be allowed for True, where 'tis fully agreeable to Scripture, Reason, and Philosophy.¹⁹

Whiston's exposition employed mathematical terminology—postulata, corollaries, lemmata, hypotheses—as befitted Newton's successor to the Lucasian Chair. Newtonian astronomy sustained the proposition that precisely 1,700 years after the Creation, on Thursday 27 November, a comet had passed by the earth, its atmosphere and tail causing the Deluge. Newton's acceptance of Whiston's flowery dedication may or may not have signified total approval of everything he wrote: in many scriptural matters Newton was not content with Whiston's over-zealous interpretations. But there was no repudiation of the book. John Woodward's *An Essay toward a Natural History of the Earth* (1695) was compiled in the same spirit: fossil remains uncovered in mines were conclusive evidence of the accuracy of the Biblical description of the flood; and gravity explained the distribution of heavier fossils in lower strata. The Bible and the new science were being locked in deadly embrace.

The common objective of the Newtonians did not preclude bitter argument and counter-argument within the group over details of the great conciliation of scriptural texts and the findings of science. The acrimony between John Kell and Whiston debating the facts of a holy physics was as sharp and personal as any secular scientific quarrel of that contentious age. But their books appeared in scores of editions, flooded the English market, spilled over into foreign translations, adaptations, and imitations, and did as much as *Newtonism for the Ladies* to make the Newtonian system respectable. By 1774 Herder claimed that he could enumerate fifty systems of *Physiktheologie*.²⁰ They showed with scriptural proofs that God Himself preferred to follow mathematical laws and when it was convenient always

¹⁹ Whiston, *A New Theory of the Earth*, p. 95.

²⁰ Johann Gottfried Herder, *Aelteste Urkunde des Menschengeschlechts*, in *Sämmtliche Werke*, ed. B. Suphan (Berlin, 1877–1913), vi, 202.

employed natural mechanisms like comets to effect moral ends.

Viewed in retrospect, the extravagance of some glorias and the cock-sureness of the *physica sacra* as Newtonians practised it during Newton's lifetime violated the separation of the two books in a flagrant manner; and, though the builders of the *physica sacra* never allowed a scriptural passage to interfere with the logic of experimental evidence or a scientific demonstration, their enthusiasm for harmonizing Scripture and science led to the proliferation of bizarre literary fantasies bearing the trappings of science and created a blurred zone in which the two books were confounded. Neither Descartes, who had mocked the presumptuousness of a theology of glory—as though God were looking for the plaudits of puny man when he created the world—nor Spinoza, who saw the Scriptures as a political and moral, not a philosophical or scientific, document, would have allowed any such random crossing of the frontier.

Newton's way of tolerating his disciples' philosophy may be likened to his explanation of the conduct of Moses in preparing the account of the Creation in Genesis. Moses knew the whole of the scientific truth—of this Newton was certain—but he was speaking to ordinary Israelites, not delivering a paper to the Royal Society, and he popularized the narrative without falsifying it. The standards Newton permitted for the edification of lay audiences at the Boyle Lectures (he may have played a role in the selection of the first lecturer, Richard Bentley²¹) and in exercises of the *physica sacra* were rather relaxed. He let his children play, and he pulled in the leading-strings sharply only when they created a public incident.

Though Newton may have been put off by the more extravagant fusions of science and Scripture produced by some of his disciples, he was after all himself a major source of the confounding of the two books. In adopting the Baconian metaphor, he repeated the strictures against confusing the two kinds of researches; but in personal practice

²¹ H. Guerlac and M. C. Jacob, 'Bentley, Newton, and Providence?', *Journal of the History of Ideas*, xxx (1969), 316.

he failed to maintain the compartmentalization of religious and scientific studies and the two were allowed to overlap and interpenetrate. What was a convincing rhetorical formula for political purposes could not be internalized in the psyche.

Let me illustrate with a few examples the continued intertwining of science and religion throughout Newton's life, well before he was driven to assert publicly and forthrightly in Query 20 of the 1706 Latin edition of the *Optics*: 'And though every true Step made in the Philosophy brings us not immediately to the knowledge of the first Cause, yet it brings us nearer to it, and on that account is to be highly valued',²² and in the second edition of the *Principia* that to discourse of a Deity from the phenomena was a concern of 'experimental philosophy', a phrase changed to 'natural philosophy' in the third edition, though not necessarily for the reason proposed by some scholars.²³ The commonplace

²² Newton, *Optics*, 2nd edn. in Eng. (London, 1717); Query 28 (the English version of Query 20 in the 1706 Latin edition).

²³ Newton, *Principia*, ed. Koyré and Cohen, ii, 764. That the change occurred is patent, but is there evidence for the observation: 'Later on, after mature reflection, Newton decided that he had been careless and so . . . he toned down his statement about God to read "ad Philosophiam naturalem pertinet" rather than "ad Philosophiam experimentalem pertinet"?' See I. Bernard Cohen, *Introduction to Newton's 'Principia'* (Cambridge, Mass., 1971), p. 244.

There are alternative versions, hitherto unnoticed I believe, of this part of the General Scholium in the Public Record Office, Mint Papers, and one of them preserves the 'ad philosophiam experimentalem pertinet'. The following (V, fol. 45^v) appears on the back of some notes on assaying and refining and on the coining of a peace medal:

'Pro (varietate) diversitate locorum ac temporum diversa est rerum Natura, et diversitas illa non ex necessitate metaphysica, quae utique eadem est semper et ubique, (non) sed (alimunde quam) ex voluntate sola entis necessario existentis oriri potuit. Sola voluntas principium fons et origo est mutationis ac diversitatis rerum, ideoque Deum veteres ἀποκρίωνοι dicebant. 'Μηροκρίωνοι est (Deus) Agens (Principium) primum, quod de fato et Natura dici non potest. (et ex voluntate sola entis necessario existentis) Pro diversitate locorum ac temporum diversa est rerum finitarum natura, et diversitas illa non ex necessitate metaphysica, quae utique eadem est semper et ubique, sed ex voluntate sola Entis intelligentis et necessario existentis oriri potuit. Et haec de Deo, de quo etc.

'Agens primum ut sit primum, ἀποκρίωνοι esse debet, et propterea potestate volendi praedictum est: quod de fato et Natura dici non potest. Pro diversitate locorum ac temporum diversa est rerum omnium finitarum natura, et diversitas illa non ex necessitate Metaphysica (quae utique eadem est semper et ubique) sed ex voluntate [sic] sola Entis intelligentis et necessario

book of his early years in Cambridge is the record to which historians of his scientific ideas have turned for the first inklings of his major discoveries. But interspersed with the subjects Francis Bacon had listed as appropriate for investigation are other headings like 'Of God' and 'Of Creation'. 'Of God' is a stereotyped excerpt showing divine design in the fashioning of the human body and attacking the doctrines of Epicurean atomism and chance—it comes straight from Henry More. Under other rubrics philosophical argument and citations from Scripture are intermingled, as Newton endeavours to define extension and time for himself and as he tries his hand at cosmological speculation. A verse in Hebrews is interpreted to mean that God created time, and in one passage Newton is beginning to inquire into the meaning of the phrase 'Son of God'.

Analysis of a few lines in an entry entitled 'Of Earth' in this same commonplace book may demonstrate as well as any text I know how interwoven were Newton's inquiries into the Book of Scripture and the Book of Nature from the very outset of his career. Into a few terse phrases from the Apocalypse he compressed a wealth of scriptural evidence for his belief that the world was moving inexorably toward a cataclysm, a great conflagration, to be followed by a yet undefined form of renewal. His explication is in one of the normative exegetical traditions of the Talmudic rabbis and Puritan divines, whose underlying assumption was that Scriptures do not contain a single superfluous phrase, or even a letter that does not have significant meaning—a sort of law of parsimony. Since the verses of the Apocalypse to which Newton refers in the folio 'Of Earth' may not be as familiar to all of us as they were to him, I quote the whole passage: 'And the devil that deceived them was cast into a lake of fire and brimstone, where the beast and false prophet existents oriri potuit. Et haec de Deo de quo utique ex phaeoljnmensis disputare, ad Philosophiam experimentalem pertinet.'

Another page of the Mint Papers (I, fol. 62^v), with remarks on the weight of gold and silver in coins and on the beginnings of geometry in Egypt, includes these sentences: 'A necessitate metaphysica nulla oritur rerum variatio. Tota illa quam in mundo conspicimus, diversitas rerum a sola entis necessario existentis voluntate libera oriri potuit.'

are, and shall be tormented day and night for ever and ever.' In the notebook folio where Newton proved the renewal of the world, he merely jotted down the phrase 'Days and nights after the Judgment Rev 20c, 10v'.²⁴ The full meaning of the elliptical phrase would be obvious to one who had been subjected to years of exegetical sermons and had absorbed their manner of thinking. Tormenting the wicked for ever and ever is quite comprehensible and sufficient unto itself, and the prophet could have been expected to stop at that. But when John inserted the words 'day and night', which are seemingly superfluous and in excess, he surely meant to inform us of something—in this instance that the succession of days and nights would still be marked after Judgement Day. And that presupposed a new heaven and a new earth without which such a succession would be meaningless. Thus John in Revelation was communicating an important fact about the future history of the physical universe which later became part of one version of Newton's cycloid cosmological theory.

Newton has also left us a fragmentary and often fantastical history of science contained in pieces scattered throughout his chronological and alchemical papers that further exemplifies the interpenetration of science and religion in his world-view. Papers headed 'The original of religions' are especially pertinent. A single principle underlies them all. Knowledge of God's works thrived in those epochs in which there was a true conception of the Deity; and conversely, when false ideas of God dominated society—such as pagan idolatry, Greek philosophical conceptions of a meta-physical God, or papist Trinitarianism and idolatrous saint worship—there was no real knowledge of God's works. The preferred times for scientific discovery were those of primitive monotheism, of pre-Socratic thought, and of the moderns. Newton's sketch of the period of Plato and Aristotle and that of the medieval schoolmen makes of them two comparable dark ages, when false religion was bound up with false science. However committed English science was to keeping religious opinion away from its door, Newton

²⁴ Cambridge, University Library, Add. MS. 3996, fol. 101r.

found that in the history of the world they had been interdependent.

His description of primitive monotheism and the rituals of worship after the flood as practised in Egypt and Babylonia and India and Chaldea closely identified early science with theology. Achievement of a knowledge of God, or the rudiments of such a knowledge, had always been within the grasp of men; and in ages when a monotheistic belief, relatively unpolluted, held sway, the search for God in His works was fruitful, because it had a basic sense of unity to sustain it. The priests and religious leaders of these ancient civilizations were also their scientists and philosophers. They had shunned subjective approaches to a knowledge of God, the trance-like states in which direct communion with divinity was supposed to be attained or the mystical worship of abstract forces of nature as though they were a multiplicity of deities. These venerable sages had studied all the varied phenomena as parts or aspects of one creation. Their fervent belief in one God had led them to scrutinize the operation of things on earth and the movement of the stars in the heavens, and to record their observations in precious documents which, though marred by time, still held secreted within them some of the fundamental truths discoverable about God's creation. The old priest-scientists had been moved by the same conviction Newton held, that there was a first and only cause, and they had reasoned from the phenomena to that cause. Polytheism was inimical to science because it accepted the idea of contrary and contradictory causes in nature which it associated with false gods. This is the real sense of the seemingly irrelevant addendum about ancient idolatry that appears in later editions of the *Optics*.²⁵

The primitive monotheists had practised two basic forms of science, astronomy and chemistry. Astronomy had started as a gloria among Egyptian and Chaldean priests, who in decorating their temples had made them exact replicas of the universe; in turn their knowledge of the macrocosm was

²⁵ See manuscript addendum to p. 382 in the Babson Institute Library copy (no. 133) of the 1717 London edition of the *Optics*.

transmitted to the Greeks, who initiated record-keeping of the movements of the planets.

So then [it] was one designe of the first institution of the true religion in Egypt to propose to mankind by the frame of the ancient Temples, the study of the frame of the world as the true Temple of the great God they worshipped. . . . And therefore that a Prynnaecum might deserve the name of his Temple they framed it so as in the fittest manner [to] represent the whole systeme of the heavens. A point of religion then which nothing can be more rational. . . . And thence it was that the Priests anciently were above other men well skilled in the knowledge of the true frame of Nature and accounted it a great part of their Theology.

The learning of the Indians lay in the Brachmans who were their Priests, that of the Babylonians in the Chaldeans who were their Priests. And when the Greeks travelled into Egypt to learn astronomy and philosophy they went to the Priests.²⁶

Along with their macrocosmic studies, the ancients had also been preoccupied with fire and the secret qualities of metals—especially in Egypt, where at the head of the list of inquirers into the properties of fire stood Hermes Trismegistus, the priest-king-scientist of Egypt, father of alchemical studies, on whose discoveries Newton left commentaries. He was unruffled by Isaac Casaubon's revelation that the *Hermetica* itself was a post-Christian work. The original discoveries of Hermes had been handed down through the ages and incorporated in a variety of tropes, images, and emblems. Those alchemists who had preserved what remained of the authentic tradition of Hermes—men like Count Michael Maier, whose compendia of philosophical alchemy Newton had abstracted, along with the works in similar collections published by Lazarus Zetzner and Elias Ashmole—were on the right moral path in their investigations; they were searching for a first cause, for a simple unifying principle. And just as Newton could profitably study the textual fragments of ancient Greek astronomers and mathe-

²⁶ Yahuda MS. 41, fol. 8r, 'The original of religions'. See also Keynes MS. 3, fol. 35r, for the history and vicissitudes of early religions.

maticians and pre-Socratic philosophers who had observed the universe, so he could read, copy, and mediate over alchemical writings as conceivably genuine, if incomplete, revelations of God's creation. The alchemists were describing phenomena of nature, in contradistinction to the modern metaphysicians—he meant Descartes and Leibniz—who were only dreaming up systems that falsely represented God's world. Essential truths about the operations of God in nature might be extracted from the alchemical traditions if their imagery could be unravelled. (The problem was identical with the interpretation of visions in the Apocalypse.) I am here distinguishing Newton's philosophical-alchemical studies, which are pertinent to his religion, from his own experiments on the borderline between chemistry and alchemy, for which he stoked the fires in a little Trinity College laboratory. In spirit, Newton felt himself closer to the hermetic philosopher who wrote about the properties of metals and experiments with fire than to the philosopher who conjured up a system of vortices or hypothesized a pre-established harmony. From Thoht, who was really Hermes Trismegistus, down to the contemporary practitioners of the art with whom Newton had occasional secret converse, the alchemists, he told Conduitt, were moral and God-seeking men worthy of respect even when they had erred.²⁷ Newton was clearly affected by the European flowering of alchemy in the sixteenth and seventeenth centuries, and was at various times touched by both metal-embodling and theosophical alchemy.

Yet Newton's lifelong reading of books of philosophical alchemy hardly aligns him with the Rosicrucian mystifiers, though many seventeenth-century adepts of alchemy were Rosicrucians. When he studied a Rosicrucian tract, he condemned it as an 'imposture'—a strongly pejorative word in his religious vocabulary, akin to false prophecy. Newton is not to be identified with every book he perused. He often analysed works in a spirit of retutation and denial, and it would be as far-fetched to make a Rosicrucian out of him because he read Thomas Vaughan's translation of the

²⁷ Keynes MS. 130.

Fama and *Confessio*²⁸ of the Brotherhood as it would be to turn him into a Cabbalist because he paraphrased passages from Christian Knorr von Rosenroth's *Kabbala Denudata*. Newton tried to de-mystify alchemical ideas, which were difficult to comprehend because they were enshrouded in mythic and symbolic language. In immersing himself in lengthy treatises on philosophical alchemy, he was looking for keys to the world of nature, preserved in cryptic religio-scientific formulas and allegories. But he did not find the ultimate truth there; and though he appreciated the moral purpose of the alchemists, whose writings are full of pious dedications of their work to the service of God, only the hieroglyphs of the Biblical prophecies themselves contained God's direct word. Newton discerned rationalist elements in all emblemata; but the Rosicrucian mystical combination of magic, Cabbala, and alchemy was alien to his Scripture-bound religion—it savoured of enthusiasm and was too remote from God's historically revealed word in the Bible.

Newton often speculated about why the ancient wise men had resorted to mythic language. His answers were invariably commonsensical and historical: the priest-scientists were dealing with an ignorant rabble, even as Moses was confronted by a rough mass of rebellious Israelites. These priest-scientists were truth-sayers in their way; but how explain the truth, the need for direct worship of one God, to a mob that could not understand real things, facts, phenomena? To treat them like children and to record scientific data in myths and fables was perhaps disguising God's creation, but not falsifying it.

²⁸ Ian Macphail, in *Alchemy and the Occult. A Catalogue of Books and Manuscripts from the Collection of Paul and Mary Mellon given to Yale University Library* (New Haven, 1968), ii: 347-8, reproduces Newton's notes on a copy of *The Fama and Confession of the Fraternity of R.C. Commonly, of the Rosie Cross. With a Praeface annexed thereto, and a short declaration of their Physical Work by Eugenius Philadelphus* [ed. Thomas Vaughan] (London, 1652): 'R.C. the founder of ye supposed Rosy Crucian society (as the story goes) was born 1378 dyed anno 1484, his body was found 1604 and within a year or two (when the new stars in Cygnus & Serpentarius shone) did ye Society put out their flame, Or rather anno 1613 as Michael Maierus affirms in his book de legibus Fraternaliatis R.C. cap. 17, printed anno 1618 & in his Symbola aureae mensae dated in December 1616 where (pag 290) he notes that ye book of Fama & confession were printed at Frankford in autumn 1616. This was the history of ye imposture.'

Alas, the early history of science did not progress smoothly. Error, corruption, the devil, power-grasping monarchs, and ignorance intruded—there is a confusion of causes here drawn from a variety of contemporary sources—and the common people reified the images in the fables, worshipping them as gods, forsaking the purity of primitive monotheism.²⁹ The Egyptians fell into beast-worship by adoring animal hieroglyphs, which had once represented factual knowledge about nature. Thenceforward neither religious nor scientific truth, which were always dependent on each other, could flourish. If the papist intrigues of James II were uppermost in Newton's mind, he imputed the fall from true religion into idolatry to kings and courts. If he was thinking of the fanatical tinkers of the Civil War, he was likely to blame the fall on the superstition of the ancient masses. In either event there is an assumption that only with the resurgence of pure monotheism could science thrive once again, a position that indissolubly links the destinies of the two books.

On the moral level Newton never insulated science from the surrounding world, any more than Bacon had. The activities of the scientist were subject to moral and religious commandments. Applications of science were to be controlled by the two fundamentals of religion, love of neighbour and love of God as set forth in Scripture. For most of his life Newton displayed sovereign indifference to the practical usages of science, though in his later years he served on all manner of government boards. But when there was danger that scientific knowledge might be adapted to destructive purposes, he intervened. In 1676 he wrote a strange letter to Henry Oldenburg raising the spectre of unnamed perils to mankind if the practical alchemical processes that Boyle was said to possess should ever fall into the hands of the uninitiated.³⁰ Toward participation by scientists in the development of military machines Newton seems to have been somewhat ambivalent. David Gregory reports Newton's proposal to 'Cure the Bucking and wideness of touch-hole of

²⁹ On the origins of idolatry see New College MSS. 361, III, fols. 32^r, 34^r and v, 65^r, 66^v.

³⁰ Newton, *Correspondence*, ii: 1-2, Newton to Oldenburg, 26 Apr. 1676.

great Gunns' by means of a new metallurgical mixture; but there is a contrasting story that he was hostile to the application of science to warfare, and told young David Gregory to do away with the model of his father's new cannon because lethal devices did not serve the legitimate purposes of science.³¹ One does not find in Newton's writings anything resembling John Wilkins's or Joseph Glanvill's enthusiasm for the proliferation of utilitarian inventions. Newton's scrutiny of nature was directed almost exclusively to the knowledge of God and not to the increase of sensate pleasure or comfort. Science was pursued for what it could teach men about God, not for easement or commodiousness.

In review, Newton's separation of the two books appears to signify little more than the idea that science had nothing to say about the dogmatic content of religion, and that Scripture was not to be quoted in a Royal Society communication. Otherwise they were bound in many ways. Newton did not conceive of one book as sacred and the other as secular or profane. The worth of the two books was equal, and there could be no invidious comparisons between them. And whatever knowledge of God was revealed in the one was harmonious with what was unfolded in the other. At a later point I shall have occasion to show how sound scientific method was embodied in his principles of prophecy interpretation. But let me anticipate myself with one of his reflections in a manuscript on rules for interpreting prophecy, a rare instance in which he dwells on the similarity between the goals of the scientist and of the prophecy expositor, and discloses in plain language that an identical quest for simplicity and unity underlay his researches into both books. In Newton's 'spiritual workshop', as Einstein called it, there was a dominant passion.

Truth [Newton wrote] is ever to be found in simplicity, and not in the multiplicity and confusion of things. As the world, which to the naked eye exhibits the greatest variety of objects, appears

³¹ W. G. Hiscock, ed., *David Gregory, Isaac Newton and their Circle: Extracts from David Gregory's Memoranda, 1677-1709* (Oxford, 1937), p. 25; Agnes Grainger Stewart, *The Academic Gregories* (New York, 1901), p. 23; Charles Hutton, *Mathematical and Philosophical Dictionary*, 2nd edn. (London, 1815), i. 605.

very simple in its internal constitution when surveyed by a philosophic understanding, and so much the simpler by how much the better it is understood, so it is in these [prophetic] visions. It is the perfection of God's works that they are all done with the greatest simplicity. He is the God of order and not of confusion. And therefore as they that would understand the frame of the world must endeavour to reduce their knowledge to all possible simplicity, so it must be in seeking to understand these visions.³²

Instead of highlighting the differences between the two books in the manner of scientific warriors of the earlier seventeenth century, Newton was discovering a spirit common to both of them, a divine simplicity in Nature and in Scripture, as befits the works of one Master Creator.

In virtually abolishing the distinction between the two books, which he revered as separate expressions of the same divine meaning, Newton was making a last great attempt—one and the same time to keep science sacred and to reveal scientific rationality in what was once the purely sacral. The coupling of the two realms—the religious and the scientific—is the syncretistic fantasy of a scientific genius and a God-seeker. But even Newton was uneasy about the amalgam. If in the 1670s and 1680s his belief in the sacral nature of science—though not always clearly articulated—bears the stamp of authenticity, toward the end of his days he was aware that science and its uses were becoming independent of the divine, despite the proliferation of books of *physica sacra* and the depth and pervasiveness of his own religious feelings. Secular Newtonianism was in fact destroying the religious-scientific world-view that Newton had created. Historically, it was the Book of Nature and its rules that were destined, as in an apocalyptic vision, to devour the Book of Scripture, and he who would be the new Christ became Antichrist.

³² Yahuda MS. 1. 1, fol. 14r. See Appendix A below, p. 120.

CORRUPTERS ANCIENT AND MODERN

IN 1802 Henri de Saint-Simon, a declassed French noble, summoned his contemporaries to found a new church under the hegemony of scientist-priests, and he called it the Religion of Newton.¹ Similar fantasies had cropped up before, toward the end of the eighteenth century. Another French aristocrat, with the unlikely name of Champlain de la Blancherie, issued a manifesto roundly denouncing the English nation for its failure to honour Newton's divine person, redated the calendar from the year of Newton's birth, and proposed the establishment of a sanctuary at Woolsthorpe.² The architect Etienne-Louis Boullée designed a cenotaph of gigantic proportions in the shape of a perfect hollow sphere, representing the primitive earth before it had become flattened by rotation, as an appropriate shrine in which to adore Newton the genius of pure reason. (A maquette of this project was on display in London in the autumn of 1972, during the great exhibition 'The Age of Neo-Classicism' at the Royal Academy.³) This was the culmination of Newtonian mythomania in the eighteenth century.

The religion of the historical, not the mythic, Isaac Newton, as it takes shape from his manuscripts, is bound up with the sanctification of words, not abstract reason, with theological controversies, revealed prophecies, and meticulous scriptural exegesis, all of which the Enlightenment so

¹ Claude-Henri de Saint-Simon, *Lettres d'un habitant de Genève à ses contemporains* (Paris, 1803).

² F. C. C. Rahin-Champlain de la Blancherie, *De par toutes les Nations. L'Agent général de Correspondance pour les Sciences et les Arts (M. de la Blancherie), à la Nation Anglaise: Proclamation dans l'esprit des jeunes ordonnés par le roi, pour les années 1794, 1795, et la présente* (London, 1796).

³ *The Age of Neo-Classicism*, catalogue of the exhibition (The Arts Council of Great Britain, 1972), nos. 1019-21.

contemptuously repudiated. The *Nullius in verba* of the Royal Society applied only to the human, not to the divine, Word.

For Isaac Newton, the whole structure of the Christian religion rested on a foundation of scriptural truths, and the different capacities of men to comprehend them. There was milk for babes, the simple belief necessary for admission into the communion of Christians, summarized in what he called the primitive apostolic creed; and then there was meat for strong men, to which only a select body of Christians could aspire, those who devoted themselves assiduously to scholarly divinity, the study of the writings of Moses, the Prophets, and the Apostles as oracles of truth inspired by a holy prophetic spirit.⁴

For besides the first principles and fundamentals of religion contained in the doctrine of baptism and laying on of hands and in the Creed which all are to learn before baptism, and which the Apostle therefore compares to milk for babes, there are many truths of great importance but more difficult to be understood and not absolutely necessary to salvation. And these the Apostle compares to strong meats for men of full age who by use have their senses exercised to discern both good and evil. With these truths the mind is to be fed continually as the body is with meats.⁴

Those who turned to this higher calling would grow in grace and in knowledge of the Lord Jesus Christ to the end of their lives.

In the early Church, as interpreted by Newton in his histories, the original formula of Christian belief, the milk for babes, had been contained in a few phrases about God the Creator, Christ, and the Resurrection taken directly out of Scripture. Any later deviations were corruptions. Newton's position was forthright and unequivocal:

We are commanded by the Apostle (1 Tim 1.13) to hold fast the form of sound words. Contending for a language which was not handed down from the Prophets and Apostles is a breach of the command and they that break it are also guilty of the disturbances and schisms occasioned thereby. It is not enough to say that an

⁴ Yahuda MS. 15. 3, fol. 46^r; see also 'Trenicum', in McLachlan, *Newton's Theological Manuscripts*, p. 32.

article of faith may be deduced from scripture. It must be expressed in the very form of sound words in which it was delivered by the Apostles. Otherwise there can be no lasting fixity nor peace of the Church catholic. For men are apt to vary, dispute, and run into parings about deductions. All the old Heresies lay in deductions; the true faith was in the text.⁵

In an ideal Christian polity anyone who subscribed to the primitive apostolic creed—'short and free from repetitions as a symbol of religion ought to be . . . easy to be understood and remembered by the common people', Newton said⁶—was not to be excluded from the communion or in any way persecuted, no matter what other religious opinions he might hold. 'I may add', he wrote, 'that it [the Creed] contains not mere theories like some of those Articles which we have omitted but all its Articles are practical truths on which the whole practise of religion depends.'⁷ Newton's attitude toward temporal and ecclesiastical authorities who had added a rout of ceremonials and extraneous verbal formulas varied with his mood, his temper, and political exigencies. There were times when he branded such demands for conformity as criminal, the impositions of self-seeking secular powers. Contemporary civil governors who instituted by force particular religious practices were equated with the evil emperors of the late Roman world; Churches that had recourse to the civil arm were violators of the law of Christ.

We are not to measure Persecution by the rule of Persecutors. The Magistrate may punish or cut off any for their vices or evil actions but not professors of Christianity for erroneous opinions, least they pluck up the Wheat with the Tares. The Church may reprove or excommunicate but she has as little authority to guide the arm of the Magistrate as to handle his sword: for this is to make her self the judge and him but the executioner. She may excommunicate but not force into communion. Christ never instituted that a means of her propagation and preservation. If we would have them one with us we must use the proper means to beget faith in them, and not urge them by violence to do what is contrary to their persuasion, seeing whatsoever is not of faith is sin. By violence a Church may increase her numbers but ever

⁵ Yahuda MS. 15. 1, fol. 11^r. ⁶ Yahuda MS. 15. 5, fol. 98^v. ⁷ *Ibid.*

allays and debases her self with impure mixtures, force prevailing with none but Hypocrites. And this I take to be the chief reason of the great wickedness of the Romans which ensued Theodosius's reign, his persecution squeezing out the conscientious and filling the persecuting church only with the Hypocritical part of the Empire. Every Persecutor is a Wolf Math 10. 16, 17, and every Christian that preaches it is one of the fals Prophets called Wolfs in sheeps cloathing Math 7.⁸

The Roman emperors who imposed religious conformity—and by implication the same held for the monarchs of Newton's time—were serving their own interests, not those of the Church, and Church Councils were mere slavish tools:

For the Emperors hence forward by their Councils made several new articles of faith in forms of words not received from the Apostles by tradition, and modelled the Christian religion so as suited best with the interest of their Empire and with the inclinations of the people that all of them (heathens hereticks and Christians) might unite and become of one mind and one religion. For its notoriously evident that the Councils always established the opinions of the Emperors who convened them.⁹

On occasion Newton adopted a milder tone and pleaded that as long as non-apostolic words and ceremonials, alien though they might be, were allowed to be interpreted symbolically or 'innocently', they should be tolerated by all concerned for the sake of peace. The two fundamental commandments of religion, love of God and love of neighbour, were the same for both Christians and Jews despite their ritual variations, and had once been the basis of unity in the Church. In one fragment Newton called these principles 'the laws of nature, the essential part of religion which ever was and ever will be binding to all nations, being of an immutable eternal nature because grounded upon immutable reason'¹⁰—loose language that comes as close as Newton ever ventured to the rhetoric of eighteenth-century Deism. His outlook, however, had nothing in common with the teachings of Blount and Collins and Toland, because of the centrality in his religion of historically ordained divine

⁸ Yahuda MS. 39, fol. 1^r and v.

¹⁰ Yahuda MS. 15-5, fol. 91^r.

⁹ Yahuda MS. 15-7, fol. 190^r.

commandments and the absolute truth of prophetic revelations.

The primitive apostolic formula had once served as a bulwark against unbelievers. Originally transmitted by word of mouth, it had been a sort of password among Christians that differentiated them from heretics and heathens. But before the end of the second century corruption had slowly crept into the Latin churches, first by the addition of new articles couched in the language of Scripture, thus setting a precedent for a 'creed-making authority',¹¹ and then by the introduction of metaphysical terminology nowhere to be found in Scripture. All was brought into confusion, and the drama of apostasy in the Church had begun.

Were Newton the restorer of religion, he would have ordinary Christians merely repeat the primitive apostolic formula and obey the commandments. As for the precise significance of the words, men might differ without falling out with one another.¹² But since Newton the scholar of divinity could not himself remain content with such milk for babes, he had to search in Scripture and in the history of the Church for the more profound meaning of the creeds, above all of the person of Jesus Christ, what He was in the beginning and what He would be in the end of the days, and what were His relations to God the Pantocrator.

Newton's manuscript fragments on Jesus and the Trinity have been doled out to posterity in driplets, from the mid-eighteenth-century printing of his two learned letters against the proof-texts in John and Timothy to David Brewster's rather bewildered publication of a few irenic manuscripts and McLachlan's excerpts from the Keynes papers. And the manuscripts on the nature of Christ, written over a period of nearly half a century, remain largely unpublished to this day.

There are many theological questions on which Newton never settled into a fixed position. Did Christ exist before all worlds and did He create this one at God's command? Was Christ a higher or a lower being than the angels? The controversial problems of the nature of Christ were summarized rather succinctly in papers based on what Scripture—his sole

¹¹ *Ibid.*, fol. 92^v.

¹² *Ibid.*, fol. 95^v.

guide—had taught him. He was weighing alternatives, as Locke did in his 'Adversaria Theologica'. Parallels to many of Newton's antitrinitarian arguments can be found in the voluminous writings of Samuel Clarke and William Whiston, and in those of the avowed Unitarian Thomas Emlyn, the humanitarian Hopton Haynes, the Socinian Samuel Crell. These men had a common antitrinitarian treasury well stocked with Biblical quotations, despite their differences over points of doctrine that theologians might consider of great moment. Newton ploughed through their works and the frequent episcopal refutations they provoked; but he invariably tried to find his own way. It is an error to seize upon his antitrinitarianism in order to pigeonhole him in one of the recognized categories of heresy—Arian, Socinian, Unitarian, or Deist.

While Newton's chief villain in the history of the Church was Athanasius rather than Arius, he censured both for having introduced metaphysical subtleties into their disputes and corrupted the plain language of Scripture:

Both of them perplexed the Church with metaphysical opinions and expressed their opinions in novel language not warranted by scripture. The Greeks to preserve the Church from these innovations and metaphysical perplexitys and put an end to the troubles occasioned by them anathematized the novel language of Arius in several of their Councils, and so soon as they were able repealed the novel language of the homousians, and contended that the language of the scriptures was to be adhered unto. The Homousians made the father and son one God by a metaphysical unity the unity of substance: the Greek Churches rejected all metaphysical divinity as well that of Arius as that of the Homousians and made the father and son one God by a Monarchical unity, an unity of Dominion, the Son receiving all things from the father, being subject to him, executing his will, sitting in his throne and calling him his God, and so is but one God with the Father as a king and his viceroy are but one king. . . . And therefore as a father and his son cannot be called one King upon account of their being consubstantial but may be called one King by unity of dominion if the Son be Viceroy under the father: so God and his son cannot be called one God upon account of their being consubstantial.¹³

¹³ Yahuda MS. 15. 7, fol. 154^r.

In the light of modern scholarship, Newton's Athanasius is an imaginary figure, having long since been denied authorship of the creed to which his name is attached. In addition to exposing what he believed to be Jerome's falsifications in New Testament texts and the wicked manipulations of Athanasius,¹⁴ Newton went to great pains to distinguish his private beliefs about the nature of Christ from the beliefs of both orthodox Trinitarians and those who conceived of Him as a mere man. And the arguments he used have a personal flavour, even though they are hardly revolutionary innovations in heterodox Christology. The name God was never used in Scripture to denote more than one of the three persons of the Trinity at the same time, Newton contended, and when it appeared without particular restriction to the Son or the Holy Ghost it always signified the Father. The distinction of the Son from the Father was further evidenced by the Son's confession of His dependence upon the will of the Father, by His acknowledgement that the Father was greater, that prescience of all future things was in the Father alone. But Christ was not a mere man. He was the Son of God, not just a human soul who was sent into the world. Had it been otherwise, the Apostles would most assuredly have mentioned a fact of such great consequence. God was called Almighty, the appropriate epithet. Though this did not limit the power of the Son, it meant that Christ's power was derived from the Father and that of Himself He could do nothing. In all things the Son submitted His will to the Father, which would be altogether unreasonable if He were His equal. The union of Father and Son was like that of the saints, an agreement of wills. The same attributes could be applied to the Father and to the Son, but they were different in nature since the Son's attributes were a grant from the Father. 'The heathens made all their Gods of one substance and sometimes called them one God, and yet were polytheists. Nothing can make two persons one God but unity of dominion. And if the Father and Son be united in dominion, the son being subordinate to the father and sitting in his throne, they can no

¹⁴ 'Paradoxical Questions Concerning the Morals and Actions of Athanasius and his Followers', in McLachlan, *Newton's Theological Manuscripts*, pp. 60–118.

more be called two Gods then a King and his viceroy can be called two kings.¹⁵ In another manuscript, Newton refuted the doctrine of consubstantiality with the negative argument that it did not establish Christ's divinity or His right to be adored. 'The heathens and Gnosticks supposed not only their Gods but even the souls of men and the stars to be of one substance with the supreme God and yet were Idolaters for worshipping them. And he that is of this opinion may believe Christ to be of one substance with the father without making him more then a meer man. 'Tis not consubstantiality but power and dominion which gives a right to be worshipped.'¹⁶

Newton constantly adverted to the bodily form of Jesus; He was no spirit, as some of the Gnostics claimed. There was textual evidence of His many corporeal appearances on earth. 'His wrestling with Jacob is as full a proof that he had a body before his incarnation', Newton wrote, 'as his being handled by Thomas is a proof that he had a body after his resurrection. Not the body of an Angel which hath not flesh and bones but a body which by the power of his will he could form into the consistency and solidity of flesh and bones as well before his incarnation as after his resurrection.'¹⁷ In the course of time Christ had assumed and would assume many shapes and forms both spiritual and physical as a Saviour, a messenger, an agent, a vice-ruler under God, a judge. He was carrying out the will of God. But it was the greatest of blasphemies to identify His substance with God.

In a rejection of idolatrous practices associated with Catholicism Newton uttered the troublesome words: 'Nor may we invoke Angels or the souls of dead men as Mediators between God and Man. For as there is but one God so there is but one Mediator between God and man, the man Christ Jesus.'¹⁸ But the phrase 'the man Christ Jesus' (out of 1 Timothy), which appears in Newton's manuscripts many times, should not be pulled out of context to impute to him an eighteenth-century Deistic view that identified Christ as merely another prophet or an inspired human being; nor

¹⁵ Yahuda MS. 15. 7, fol. 154^r.

¹⁷ Yahuda MS. 15. 7, fol. 154^r.

¹⁶ Yahuda MS. 15. 5, fol. 98^r.

¹⁸ Yahuda MS. 15. 4, fol. 67^v.

should Newton be transformed into a nineteenth-century New England Unitarian, though many have tried. Newton and his spokesmen Richard Bentley and Samuel Clarke were explicit in distinguishing their views on Christ and revealed religion from the growing fashion of Deism. Christ was the Messiah and the Son of God; and after the resurrection, it was Christ who would prepare heavenly mansions for the elect in a remote part of the universe.

Anything that appeared to derogate from the absolute dominion and supreme monarchy of God the Father was repugnant to Newton. The Holy Ghost was simply the spirit of prophecy. And though Christ was the Lamb of God, prayers were to be directed to 'God in the name of the Lamb, but not to the Lamb in the name of God'.¹⁹ Unlike Samuel Clarke, Newton left behind no revised Anglican prayer-book and service with every Trinitarian passage slashed through with violent penstrokes—the book is preserved in the British Museum²⁰—but he would have agreed in principle with most of the deletions and substitutions, which in each instance stressed obedience to one God owed by men as His servants and diminished the other two persons of the Trinity.

Whatever the refinements of Newton's Christological doctrines—and their detail is beyond the scope of these lectures—the impression is inescapable that the omniscient and omnipotent God, God the Lord and Master, was supplanting the image of a God of love and mercy. Among the major seventeenth-century scientists, both Catholics and Protestants, there was a perceptible movement away from the Christological centre of religion. Galileo and Descartes avoided mention of Jesus in their writings. Kepler and Newton composed treatises on the life of Christ, but the focus of their interest was dramatically indicative of a shift in emphasis. On the basis of astronomical data, Kepler revised the year of Christ's birth to 5 B.C. Newton quoted Kepler with approval, and the intent of his own essay was to prove that the Crucifixion took place in A.D. 34, not 33; at one

¹⁹ *Ibid.*

²⁰ The Book of Common Prayer (London, 1724), with manuscript additions and alterations by Samuel Clarke (British Museum: C. 24. b. 21).

point he even surmised, through a meticulous historical reconstruction of the times, that Christ was born in the spring and not on Christmas Day, a pagan festival.²¹ The birth of Christ the Saviour had become a debatable chronological subject. As the omniscience and omnipotence of God were slowly driving away His all-lovingness, the Christ who was the symbol of eternal love ceased to hold a place of primacy. Of course there are passages on divine mercy in Samuel Clarke's sermons and in Newton's manuscripts; but they are minimal if compared with glorifications of God's omniscience and omnipotence. Without being fully aware of it, Newton may have been preparing the way for that new religion fit for the scientific age—a religion of great power and knowledge and precious little love, upon which late-eighteenth-century Frenchmen were so eager to bestow his name.

But if the role of Christ in Newton's theology was far from orthodox, and if in his history of the churches he continually reiterated his antitrinitarian beliefs, why did he not stand up and fight alongside William Whiston against every alien phrase insinuated into the primitive apostolic creed? Why did he not join the 'Society for the Restoration of Primitive Christianity' that Whiston had founded? After Newton's death, the humanitarian Hopton Haynes, who had worked under him at the Mint for decades, criticized him in private for not having heeded the call to lead a reformation in the Church equal to that of Luther and Calvin;²² and Whiston, who was ousted from the Lucasian Chair as a heretic, in his memoirs accused Newton of religious duplicity.²³

Was Newton hypocritical? Was he afraid? Had he succumbed to the fleshpots when he became Master of the Mint and President of the Royal Society? There are those for whom the revelation of the Tartuffe in a great man is a singular pleasure—it lowers him to our ranks, if only for a moment. The divine Newton, it would seem, was all too human. But there were cogent reasons for Newton's refusal to throw in

²¹ Yahuda MS. 5. 1, fol. 7^r; Yahuda MS. 25, fols. 20^r, 21^r.

²² Hopton Haynes, *Causa Dei contra novitates* (London, 1747), pp. 31, 58.

²³ William Whiston first indicated Newton's heterodoxy in *Historical Memoirs of the Life of Dr. Samuel Clarke* (London, 1790) and then advertised it in *Memoirs of the Life and Writings of W.W.* (London, 1749)

his lot with Whiston. Newton faced the eternal problem of all dissenters within a religious or political communion: to submit, gloss over differences, remain silent for the sake of unity, or to listen to the voice of conscience and proclaim a particular truth come what may. Men's beliefs were changing. There would come a time, he told John Conduitt, when Trinitarian doctrines hallowed by the Church would be considered as outlandish as Catholic transubstantiation. Why raise tumults against an evil whose day was passing? The punishments that could be meted out to a man who published antitrinitarian views were harsh. And apart from simple motives of preserving comfort and status and tranquillity, Newton's manuscripts prove that he had authentic, deeply felt irenic convictions, which had first been nourished by the Cambridge Platonists and were reinforced during the years of his friendship with John Locke.

If the nature of Newton's Christ remains problematic despite the multiplicity of texts, Newton's devil is even more perplexing. The youthful Newton was not free from the belief in magical evil spirits common in the countryside where he was born. One of his notebooks records in shorthand a purported quotation from Jesus to be worn as an amulet for preventing ague and fever.²⁴ His manuscripts of the Cambridge years in the 1670s and 1680s, especially his commentaries on parts of Genesis and the Apocalypse, are full of direct references to the devil as a being who operates in the historical world.

The Devil who came down amongst the inhabitants of the earth and sea is the Dragon that old Serpent called the Devil and Satan. He was cast out of heaven by Michael and came down from thence among those inhabitants when he was cast out, that is presently after the victory of Constantine over Licinius. And since this Devil was not amongst those inhabitants before and came down amongst them with great wrath it implies that he was their enemy and that they were God's people, and began now to be attacked by that Devil which had hitherto reigned among the heathens. He came down from the upper court of the Temple, among the Christians who worshipped in the outward Court.

²⁴ Westfall, 'Short-Writing and Newton's Conscience', pp. 12, 13.

He came down with great wrath knowing that he hath but a short time that is a short time to reign and therefore persecuted to set up a new reign amongst them. For he immediately persecuted the Woman and made her fly into the Wilderness and made war upon the remnant of her seed who keep the commandments of God and have the testimony of Jesus. The Woman therefore and her seed were those against whom the Devil came down with great wrath, that is, the inhabitants of the earth and sea or at least the Clergy of those inhabitants. And his wrath was great, that is, he made hast to prevail, because he had but a short time to reign, being quickly to be cast into the bottomless pit.²⁵

In drafts of an Irenicum written in Newton's London period, however, the devil seems to have been metamorphosed into a symbol for lusts of the flesh and his reality becomes far more questionable. And yet, one day at the Royal Mint, a devil popped out at me from the back of an eighteenth-century manuscript-page on coinage who was not quite as abstract as the symbolic devil to whom I had grown accustomed in Newton's late-seventeenth-century papers.²⁶ Newton warns against the wiles of the 'devil who is opposed to God', and is 'the father of the wicked' and is 'worshipped by his children'. The passage, which is crossed out in part, ends with the solemn injunction: 'Resist the Devil and he will fly from you.' Manifestly, both Newton's Christ and Newton's devil underwent transformation over the years. Though the chronology of such changes must remain flexible, to make allowance for the recrudescence of beliefs of childhood and youth, the general tendency is clear, and very much in the spirit of the age: Christ and the devil were forces whose psychic potency waned during the course of Newton's life. Science was taking its toll in a subtle, almost imperceptible manner, leaving God alone in His majesty, with Newton as His interpreter.

Newton's considered public reticence and the toleration preached in his irenic manuscripts, which reduced the whole of Christianity to a few simple fundamentals hardly requiring exposition, should not, however, mislead us about the animosity that pervades his histories of corruption in the Church.

²⁵ Yahuda MS. 7. 3, fol. 32^r.

²⁶ Mint Papers, V, fol. 33^v.

These are profuse, vituperative, and in their attacks on persons, relentless. Commitment to a latitudinarian spirit was one thing; silence in the face of deliberate distortion of plain scriptural truth and the introduction of metaphysical concepts in the guise of religion was another matter. Most of Newton's theological writings are devoted to exposing falsifiers of New Testament texts, prevaricators in Church Councils, corrupters of primitive natural religion, metaphysical befuddlers of the true relations between God and man. I have dwelt elsewhere upon the psychic needs that were in part appeased by these aggressive polemics; but in the course of hunting down the enemies of true religion and unveiling their hypocrisies, Newton developed a conceptual framework that represented more than his personal requirements. There was a fairly substantial body of educated Englishmen who entertained similar beliefs and would at least have been familiar with his configuration of ideas—a far greater number than were able to understand the *Principia*.

The corrupters of religion ancient and modern were legion: the contemporary Papists and their antecedents the pagan idolaters; the English sectarian enthusiasts—the new prophets—and their equivalents the hallucinating monks of early Christianity; the Pharisaical Jews who rejected Christ; contemporary Deists and atheists, like Hobbes, and their ancient counterparts the theological Epicureans, for whom all was chance; and finally, the philosophers who mixed up metaphysics and religion, particularly the modern rationalist system-makers Descartes and Leibniz, and their predecessors the Gnostics, Cabbalists, and Platonists. These were the enemies of Newton's God. Some, like the Jews, were redeemable, and perhaps the atheists were too. The enthusiasts, as well, might be undeceived, though their immediate effect was to spread pernicious superstition. Newton accepted Henry More's view of enthusiasm and atheism as two sides of the same coin. (Samuel Butler's *Hudibras*, with its satirical jingles about millenarian prophets, was one of the rare contemporary works of light literature in Newton's library.) But Papists were the very embodiment of the mystery of inquiry

and their extermination was ordained. And the metaphysicians of all ages ranked closely behind them in sowing false conceptions of God.

Enthusiasts, mystics, speakers with tongues, what Newton called the 'hot and superstitious part of mankind', were false prophets, pretenders to a revelation they did not possess. Newton had assimilated the seventeenth-century literature from Burton to More that equated contemporary religious enthusiasm and supposed prophetic visions with plain lunacy. In his history of the churches he added his own psychological explanations of monkish religious hallucinations: they had their genesis in excesses of asceticism and were therefore not authentic messages of God, but manifestations either of disease or of the devil's wiles, alternatives between which he oscillated.

True prophecy—like miracles—had definitely ceased and for all time, because the whole of prophecy necessary for the conversion of men to religion and for their attaining a knowledge of God was already contained in Daniel and the Revelation of John. God did not indulge in supererogation. Newton and Locke had discussed such questions, and had agreed that theirs was not the day of the prophet, but of the rational prophecy-interpreter, no mean function in itself.

Along with the enthusiasts and monkish visionaries, the Jews were also beyond the religious pale. In their best monotheistic period after Moses had restored the law, they came as close as any people to Newton's idea of true religion, and there is a temptation to judaize him, especially if one restricts the definition of historical Judaism to its rationalist formulation in the works of Moses Maimonides. Both in the methods of Scripture interpretation and in the analysis of prophecy, two crucial aspects of Newton's religion, he was in the mainstream of medieval Jewish commentators, hostile to the unchecked allegorizing of the Cabbalists. His conception of the prophet could have come directly out of Maimonides as he was taught to the Anglican world by John Spencer, a colleague of Newton's at Cambridge, and by 'our Pocock', as Newton familiarly referred to the great Arabist and Hebraist of Christ Church in the General Scholium of the

Principia. The Jews had to be excluded because of their denial of the plain evidence of scriptural prophecy and their rejection of Christ; but their ultimate conversion and return to Jerusalem was foretold in language common to one branch of millenarianism.

Hence I observe these things, first that the re-establiſhment of the Jewish nation so much spoken of by the old Prophets respects not the few Jews who were converted in the Apostles days, but the dispersed nation of the unbelieving Jews to be converted in the end when the fulness of the Gentiles shall enter, that is when the Gospel (upon the fall of Babylon) shall begin to be preached to all nations. Secondly that the prophecies of Isaiah described above by being here cited by the Apostle is limited to respect the time of the future conversion and restitution of the Jewish Nation, and thirdly that the humour which has long reigned among the Christians of boasting our selves against the Jews, and insulting over them for their not believing, is reprehended by the Apostle for high-mindedness and self-conceit, and much more is our using them despihtfully, Phariscaſcall and impious.²⁷

Of all the corrupters of Christianity throughout the ages, two groups obsessed Newton, Papists and metaphysicians, and paradoxically they were intimately related to each other. In the standard style of the epoch, Papists were condemned because they were essentially idolatrous, had departed from the Unity, were worshippers of persons as gods, adorers of things, such as relics, to which they imputed powers they did not have. They had accepted the governance of a usurping Roman authority and were guilty of the murder of innocents. In his diatribes against Papists, Newton's indignation rivalled the rage of dissenting preachers: 'This is that sort of persecution by which the Beast made war with the saints and overcame them, that sort of persecution by which the whore of Babylon became drunken with the blood of Saints and of the martyrs of Jesus.'²⁸ The rule of the Papacy was identified with the reign of Antichrist; how this rule came into being and when it would be over was one of Newton's perennial preoccupations. During his psychic crisis of 1693, his inner turmoil broke forth in a groundless insinuation that Samuel

²⁷ Yahuda MS. 9. 2, fol. 158r.

²⁸ Keynes MS. 5, fol. 109r.

Pepys was trying to involve him with Papists—a nightmare of utter abomination.²⁹

The emotional outbursts against Catholicism that punctuated Newton's ecclesiastical history do not obscure, however, its basically rationalist framework. In the proemium of a Latin version of the history, Newton laid down the thesis that 'the true understanding of things Christian depends upon church history'.³⁰ Only through a circumstantial account of the degradation of the Church in a series of stages and its doctrinal deviation from the primitive creed could Christianity be stripped of its spurious accretions. The original Christian religion was plain, but 'men skilled in the learning of heathens, Cabbalists, and Schoolmen corrupted it with metaphysics, straining the scriptures from a moral to a metaphysical sense and thereby making it unintelligible'.³¹

As the historian of apostasy in the first centuries of the Church, Newton distinguished three principal agents in the propagation of the metaphysical evil: the Jewish Cabbalists, the philosophers, among whom Plato and the Platonists were the worst offenders, and the Gnostics, of whom Simon Magus was the arch-culprit. Newton's knowledge of the Cabbala was probably confined to Christian Knorr von Rosenroth's *Kabbala Denudata*, which included disquisitions by Henry More and Francis Mercurius Van Helmont.³² As his notes show, Newton studied the work with great care in order to refute its teachings. This book, which has been more talked about than looked at, was not a translation of the *Zohar* (though excerpts are included) but the first broad view in a language other than Hebrew of all the major Cabbalist trends, both those incorporated in the *Zohar* and those represented by the new sixteenth-century Cabbala of Luria Ashkenazi (the 'Ari'). The basic text of the *Zohar* itself, a late-thirteenth-century pseudonymous writing by Moses de Leon in pseudo-Aramaic, owed its wide acceptance to the preference that it was a rediscovered work by Simeon Bar Yohai of the

²⁹ Newton, *Correspondence*, iii, 279; Newton to Pepys, 13 Sept. 1693.

³⁰ Yahuda MS. 11, fol. 1^r.

³¹ Yahuda MS. 15, 5, fol. 97^v.

³² Christian Knorr von Rosenroth, *Kabbala Denudata* (i), Sulzbach, 1677; ii, Frankfurt, 1684).

second century. Along with the rest of the Christian and a large part of the Jewish world, Newton credited this traditional dating. For his purposes the Cabbalists were not contemporary Jewish mystics but ancients who lived in the early ages of Christianity. His use of the term Cabbalists to identify those who propagated esoteric and theosophical doctrines among Jews in Egypt and Palestine about the time of the primitive Church and his stress on Hellenic influence in their inventions would enjoy favour among many present-day scholars who trace the roots of Cabbala back to that period.

Newton's Cabbalists, Platonists, and Gnostics had a single false doctrine in common, which they infused into Christian theology at the time of their conversion. This was the theory of emanation, according to which lesser spiritual beings derived from God and were of His substance, but were not an act of creation of His divine Will. 'The Gnosticks after the manner of the Platonists and Cabbalists considered the thoughts or Ideas or intellectual objects seated in Gods mind as real Beings or substances, and supposed them to be male and female and to generate by emission of Substance as animals generate or as the heathens supposed their Gods to generate and thence accounted them consubstantial. . . .'³³ For Newton such a doctrine, which denied creation of the world *ex nihilo* by one God and recalled fables about the birth and proliferation of hundreds of pagan spirits, demigods, gods, and demons, was of the very essence of corruption, the denial of the first and most important commandment of the Decalogue. He discovered the fountainhead of this corruption far back in the degeneration of primitive Egyptian and Chaldean monotheism into a confused metaphysical idolatry that imputed real powers to forces in nature. The mechanics of this second fall of man had been much pondered in the seventeenth century, and Newton's version is an amalgam of contemporary theories that can be traced to the Church Fathers and to Maimonides. In Newton's world-historical view, there tended to be a single source of pollution in religion from which all later forms had proceeded, and

³³ Yahuda MS. 15, 7, fol. 108^v.

whatever the subsequent embodiments, the quintessential nature of the original evil persisted throughout all time. Newton's ideal of simplicity was as active in his historical as in his scientific and prophetic studies.

In Newton's rather fanciful history of Cabbalism, the Cabbalist Jews, through contact with Chaldean seers during the Babylonian captivity and with Egyptian priests and Greek philosophers in Alexandria, had exposed their pure Mosaic monotheism to contamination by this doctrine of emanation. It led them to conceive of the infinite, the *en-soph*, as emitting ten gradual subordinate emanations which they called *sephiroth* and which were merely reifications of the attributes of God. When some of these Cabbalist Jews became Christian, they injected their doctrines into the pure and simple belief of the early Church, breeding a murky intellectual atmosphere in which such idolatrous dogmas as transubstantiation were developed. It was but a step from doctrines of emanation to Trinitarianism.

The Cabbalists placed the root and fountain of the Sephiroths above and said that the first sephiroth [*šē'it*] Kether was a sphaere which comprehended the other nine sephiroths and was there called the highest crown. The Infinite retracted himself from a great spherical space in which he designed to create the worlds and emitted gradually into this space ten subordinate emanations. . . .

And if the theology of the Cabbalists be compared with that of the Gnosticks it will appear that the Cabbalists were Jewish Gnosticks and the Gnosticks were Christian Cabbalists.³⁴

The Sephiroths of the Cabbalists were nothing else then the powers and affections of God the father considered as divine persons (namely his Crown or first and supreme emanation, his Wisdom, his Prudence, his Magnificence, his Power, his Beauty, his Eternity, his Glory, his being the Support and Foundation of all things and his Reign) so the *Æons* of the Gnosticks were of the same kind.³⁵

When the Apostle condemned Jewish fables, 'endless genealogies and oppositions of science falsely so called', he

³⁴ Yahuda MS. 15-7, fol. 127^v. Marginalia on fol. 127^v include a reference to the *Cabb. demudata* Paris 2, p. 181, 182, 203, 204^r.

³⁵ Yahuda MS. 15-5, fol. 88^v.

meant the learning of the Cabbalists then creeping into Christianity.³⁶

The Platonists, among whom Clement of Alexandria, 'a great admirer of Plato', figured prominently, in a similar spirit made the Word the omnipotent power and wisdom and idea of the Father, and in their theology it was the Word that effected the creation, and Jesus begot himself when the Word became flesh.³⁷ Platonic notions of emanation began to spread in the Church before the end of the second century, when Greek converts to Christianity who had been addicted to the Platonic philosophy introduced them; for such men after their conversion tended to carry over the philosophical and religious manner of thinking on which they were nurtured, and thus they were in large measure responsible for the metaphysical disputes that arose in the Church. 'The education of learned men in the principles of Plato and other heathen philosophers before they became Christians, the study of the heathen learning by some learned men after they became Christians . . . and the easy admission of the hereticks into the latine church . . . gave occasion to the spreading of some erroneous opinions very early in the Church herself.'³⁸

On the back of working papers at the Royal Mint, Newton branded such errors as Platonic distortions of Christianity and singled out Athenagoras, the second-century Greek Father who was born in Athens, author of a *Libellus pro Christianis*, as a characteristic transmitter of false doctrines.

Athenagoras by calling Christ the Idea of all things, takes him for the Logos of the Platonist; and by saying that God had this Logos always in himself because he was rational from all eternity, makes Christ the inward reason and wisdom of the father, the *lógos eḗdútheros* without which the father would be *ároφος* and *áλογος*: and by calling him the first begotten of the father who was not made (or created out of nothing) but came out of the father as the Idea and energy of all things in order to Gods creating the world makes him generated not from all eternity but in the beginning of the creation, the internal Logos being then emitted or projected outwardly like the *Æons* of the Gnosticks and Logos

³⁶ Yahuda MS. 15-7, fol. 127^v.

³⁸ Yahuda MS. 15-7, fol. 116^r.

³⁷ Yahuda MS. 15-5, fol. 87^v.

of the Cataphrygians and Platonists. For Athenagoras . . . makes also the Holy Ghost an emanation of the father, not a necessary and eternal emanation but a voluntary and temporary one sometimes flowing from the father sometimes returning back to him as the rays of the Sun are emitted from him and reflected back.³⁹

Newton charged the Platonists with having bestowed esoteric meanings upon plain scriptural names for Christ that were readily understood, such as 'Lamb of God', 'Son of Man', 'Son of God'. In his church history he exclaimed in high dudgeon, 'What all this has to do with Platonism or Metaphysics I do not understand. . . . The Scriptures were given to teach men not metaphysics but morals.'⁴⁰ The facile identification of Newton with the philosophical doctrines of the Cambridge Platonists among whom he lived as a young man surely requires amendment.

The metaphysical opinions of the Gnostics, the third band of early corrupters, were drawn from both the pagan idolaters and the Cabbalists. The Gnostics separated deities male and female from the First Cause and from one another by generation, 'that is by emission of substance as animals generate other animals of the same species by seminal emissions'.⁴¹ One branch of the Gnostics believed that the maker of the world was different from the father of the Lord, that the son of the fabricator was one person and Christ from above was another, who descended upon Jesus in the form of a dove, and that when Jesus was brought before Pilate, this dove flew back to his *pleroma*.⁴² Some Gnostics professed that Jesus was the son of Joseph and Mary, others that he passed through Mary 'as water through a pipe'.⁴³ Newton extracted summaries of the doctrines of Simon Magus from the Church Fathers who had attacked him, and interpreted them to mean that Simon was the original conceptualizer of the Trinitarian heresy.⁴⁴ Lest there be any doubt about the moral consequences of such beliefs and trafficking in emanations of the divine

³⁹ Mint papers, V, fol. 37^r.

⁴⁰ Yahuda MS. 15-7, fol. 190^r.

⁴² Yahuda MS. 15-3, fol. 54^r.

⁴³ Yahuda MS. 15-5, fol. 88^v.

⁴⁴ Yahuda MS. 15-3, fol. 53^r; Yahuda MS. 15-5, fol. 83^r.

⁴¹ *Ibid.*, fol. 120^r.

essence, Newton described in some detail the assemblies and 'filthy mysteries' instituted by Simon:

His priests lived in lust and used exorcisms and incantations and magical arts and philtres and things enticing women to lust and fictions of familiar spirits and of prophetic dreams and worshipped the images of Simon and Helena in the form of Jupiter and Minerva, and in their assemblies had filthy mysteries instituted by Simon which consisted in offering to their Gods the seminal profluvia of men and menstria of women instead of the Eucharist. . . . And after adultery they offered the filthy sacrifice instituted by Simon saying this is my body and this is my blood.⁴⁵

On the philosophical level, Newton's antagonism toward the ancient Cabbalists, the Platonists, and the Gnostics, is part of an ardent defence of God the Father who created the world as an act of divine will. By contrast, doctrines of emission, emanation, generation, projection, all of which are suggestive of human procreation, seemed to derogate from the absolute independence of God's free will. Whether Newton's aversion to emissions and emanations, which reappears in scores of folios in his history of the early Church, has covert origins in the intimate experience of this lone man had best be left in the form of a question; but not to ask it would be obscurantist. It is not a belittlement of the man to consider the significance of his words on different levels.

Time and again Newton broke his narrative exposition of early church doctrine with bitter denunciations of the Cabbalists and Gnostics, who separated out the 'powers, affections, Ideas, operations, and dignities of God the father' and considered them as 'so many divine persons'.

All these things are but one thing in several degrees and have place only in the mind of man. They err therefore in ascribing to God the affections and passions of men and making him a compound. For God is not as man, nor are his thoughts like ours. He is simple and not compound. He is all like and equal to himself, all sense all spirit, all perception all *Ennaea*, all *Áoyos* all ear, all eye, all light. He is all sense which cannot be separated from it self, nor is there any thing in him which can be emitted from any thing else.⁴⁶

⁴⁵ Yahuda MS. 15-3, fols. 53^v, 54^r.

⁴⁶ Yahuda MS. 15-7, fol. 109^v.

Who upon reading this passage can fail to recall the famous query in the *Optics* that distinguishes the animal from the divine sensory and the excursion in the General Scholium where Newton dilates upon our incapacity to have any idea of the substance of God? 'Whence also it follows that he is *all Similar, all Eye, all Ear; all Brain, all Arm, all Sensation, all Understanding, all active Power*: But this not after a corporeal Manner, but after a Manner wholly unknown to us.'⁴⁷

In Newton's history of early Christianity, a curious conception of the cross-currents of religious ideas in the Mediterranean world was unfolded. He established conjunctures and relationships that have psychological, and at times even a measure of historical, validity. His interpretation is multifaceted: he combines political motives with base human passions, and he has some insight into the intellectual predispositions of converts from one religion to another. Newton made a valiant attempt to re-create the spiritual life of Alexandrian Jews, the emotional atmosphere of third-century Rome, the interplay of Greek philosophy, Egyptian mystery religions, and Jewish mystical traditions about the time of Christ. *Mutatis mutandis*, Newton might well have made a respectable historian of ideas of the late-nineteenth-century French or German positivistic school. Perhaps he was a little too hasty in establishing chains of influence on the basis of rather flimsy evidence. But there is much to be said for his free and open associations of ideas, and I am quite ready to propose him as a model for our twentieth-century history of science, to dissuade it from turning in upon itself.

Operating through intrigues in Church Councils, encouraged by recent pagan converts who wanted to preserve idolatry, supported by the secular power of emperors, the Gnostics, the Jewish Cabbalists, and the Platonists perverted the creed of the Apostles of the early Church and imposed metaphysical principles and abstract concepts upon scriptural statements about God and Christ. Such notions became papist dogmas and were not completely eradicated from Newton's own Church.

⁴⁷ Whiston, *Newton's Convolutions*, pp. 17-18.

Newton's virulent anti-metaphysical bias, one of the constants of his religious and scientific outlook, was embodied in the argument that God is a Creator, a Master, that men have a personal relationship to a Lord, not to abstract attributes, and was transplanted from ancient to modern times, from considerations of early church history to polemics in the General Scholium of the *Principia*. In the General Scholium the very same language with which Newton had excoriated the old corrupters of the Christian religion was adapted, as we have seen, to an attack on the metaphysical arguments of Leibniz and his attempts to drag Newton into a discussion of the attributes of God. After the turn of the century, when Newton was engaged in writing a critical history of ancient heresies and their propagators, the duel with Leibniz was never far from his mind. Leibnizians and Cartesians were modern exemplars of the Cabbalists, Gnostics, and Platonists. Leibniz with his intricate, metaphysical system-making understood nothing about the true nature of God. In Newton's manuscripts the word 'metaphysical' has already assumed the set pejorative meaning of its later usage among the French *philosophes*. The undertones of these utterances—and there are many—run something like this: 'I, Isaac Newton, the lad from Lincolnshire, have a plain religious faith based on my personal obedience to the Lord, and I will not be entrapped by the Leibnizian subtleties. Metaphysics wrought havoc in the early centuries of Christianity, as the history of the apostolic creed and of the church councils bears witness, and the Leibnizian arguments are likely to foster the same divisive spirit in our time.'

Newton's contempt for metaphysics thus had religious as well as scientific roots. The personal element, his rivalry with the two system-makers the dead Descartes and the living Leibniz, was always present; but even if the personal element is ignored, metaphysics remains an evil to be combated. Abstract system-making, building hypothetical structures, was a mode of thinking responsible for the perversion of the only truly revealed religion, primitive Christianity. The modern philosophical system-makers who were molesting him were acting precisely as had the ancient Platonists, Gnostics,

and Cabbalists. Instead of concentrating upon God's works, His actions, the phenomena, as a form of worship, they were presuming a knowledge of His attributes or His essence. Leibniz was Athanasius *redivivus*. Supramundane intelligences, pre-established harmonies, were hypotheses of the same order as the Cabbalist *sephiroth*, Plato's *logos*, and Simon Magus' foul emanations.

The question arises why Newton did not eschew metaphysical debate altogether, why he employed Dr. Samuel Clarke to set forth in elegant phraseology arguments for which he felt aversion and disdain. Only in the context of Newton's general conduct during the last two or three decades of his life, when he was the autocrat of British science, is his course of action in the Leibniz debate comprehensible. Newton delighted in beating his adversaries at their own game. In unmasking monkish falsehoods, he revelled in quoting Cardinal Baronijs, the official historiographer of the papal establishment.⁴⁸ Even in what went by the name of metaphysical disquisition, he could worst Leibniz and the Leibnizians. The precise nature of the collaboration between Clarke and Newton can never be determined; much oral converse was involved since they both lived in London. In the correspondence with Leibniz the refinements of the arguments were left to Clarke, but Newton's dialectical skills, when he wanted to engage, were not to be underestimated, and there are drafts in his hand that prove what was generally supposed at the time, that he was a most active contestant.⁴⁹

⁴⁸ Yahuda MS. II. 3. fol. 5^r; the reference is to Caesar Baronijs, *Annales Ecclesiastici* (Antwerp, 1594), 10 tomes.

⁴⁹ Koyré and Cohen, 'Newton and the Leibniz-Clarke Correspondence', pp. 63-126. See also A. R. and M. B. Hall, 'Clarke and Newton', *Jsis*, lii (1961), 584, for the draft of a letter in Newton's hand, written some time in 1715, that attacks Leibniz's metaphysical position and is paralleled by Clarke's fifth reply: 'And at the same time he is propound (But its said that hypotheses may in time meet with an Experimentum Crucis and Mr. Leibnitz proposes Hypotheses for that end. When Hypotheses meet with Experimenta Crucis they will cease to be Hypotheses and descend I answer that when his hypotheses that God is Intelligentia supramundana, that there is an Harmonia praestabilita that all animal motion (even in man himself) is purely mechanical, that God has created the world so perfect that it never can fall into disorder or need to be amended, that all the Phaenomena in nature are purely mechanical, that matter is indued with a self moving power'ing Hypotheses (that is) (not

Newton showed himself to be a master of academic debating techniques, and he could demolish an enemy on his own ground, with his own weapons, and with a certain cruel satisfaction. I am not recommending Newton for sainthood. Clarke 'broke Leibniz's Heart with his Reply to him', Newton once exulted.⁵⁰

From Newton's viewpoint, the insults in Leibniz's letters were outrageous. When Newton wrote 'sensorium of God' in a Query to the 1706 edition of the *Optics* he was tossing off a similitude, an analogy, he was thinking in terms of the world as God's templum; and yet Leibniz pretended to take him literally though he patently knew otherwise. He was well aware that Newton was trying to distinguish between our limited sensoria that act as clearing-houses for external images and the immediacy of God's knowledge of the world, which is incomprehensible to us. Newton had an anti-enthusiastic doctrine of the cessation of miracles, which he considered no longer necessary; but he was accused of believing that God would have to proliferate miracles. He had proclaimed God's absolute free will and His power to create, in accordance with that will, all manner of beings—animals, humans, angels, the Son who was His vicery, and a variety of spiritual entities who in the future would move over the whole world by their own motion—and he was criticized for limiting and curtailing the power of God.

Did Newton mean that God intimately discerns and clearly sees things in infinite space in His sensorium, or 'as it were' in His sensorium? Did he later add the word *tangquam*, the 'as it were', on page 315 of some copies of the 1706 *Optics* with the intention of covering himself? Inquiry into such momentous problems doubtless is a legitimate intellectual enterprise, along with the counting of those extant copies of the 1706 edition that do or do not have the *tangquam*.⁵¹ But let

Quaerers to be examined by experiments but precarious (suppositions or) opinions to be believed without proof) which turn Philosophy into a Romance.'

⁵⁰ Whiston, *Historical Memoirs of Dr. Clarke*, p. 132.

⁵¹ See A. Koyré and I. B. Cohen, 'The Case of the Missing *Tangquam*: Leibniz, Newton and Clarke', *Jsis*, lii (1961), 555-66. In some copies of the 1706 *Optics*, the passage on p. 315 contains the phrase *tangquam Sensorio suo*; in others, the

me cut the Gordian knot after my own fashion. Newton as *homo religiosus* could not have cared less about such trivia. The politic, human Newton cared a great deal about losing or scoring debating points, about priority in the invention of the calculus, and especially about charges that he was a base anthropomorphic imputing to God 'une organe', as Leibniz declared, when it was clear that Newton was using the word sensorium as an analogy, whether or not he preceded it with the phrase 'as it were'.⁵²

While Leibniz and his cohorts were plaguing Newton for having posited a universe that was not perfect in itself and required God's intervention from time to time, Newton glorified those very interventions as the supreme acts of God's providential will. God had constantly intervened in the history of the physical world: in creating it through a subordinate spiritual agent who was probably Jesus in one of His many manifestations, and in creating it in one way rather than in another; in preserving and sustaining the world and in directing comets one way rather than another. And He would possibly do other things to the physical world, perhaps burn it and start life over again on some other planet, perhaps leave a remnant and renew life on the same planet. God had also intervened continually in the history of mankind, restoring true religion after successive lapses among both Jews and Christians. The whole creation and all of history were interventions. For Newton intervention did not imply physical or historical chaos. There were underlying operational designs in the world that could be defined as the history of the motions of the planets, which displayed a marvellous orderliness, and the history of the revolutions of empires and churches, which had a similarly simple pattern—one so simple that it could be contained in two small books,

originals Koyré and Cohen argue, the phraseology is different and the *tangquam* is missing. It seems likely that Leibniz had a copy in which the *tangquam* was missing. According to Koyré and Cohen, in four out of eighteen copies they examined the *tangquam* was omitted.

⁵² In the draft of a letter to the Abbé Conti Newton wrote that no man 'except the Anthropomorphites ever feigned that God had a sensorium in a literal sence' (Koyré and Cohen, 'Newton and the Leibniz-Clarke Correspondence', p. 114).

Daniel and the Apocalypse, that were really repetitions of each other.

Newton's exasperation over the metaphysical debate with Leibniz was perhaps most sharply expressed in 1725, in the last paper he ever published in the *Transactions* of the Royal Society—there are seven drafts of it in Jerusalem. After publicly dressing down the Abbé Conti for divulging the existence of Newton's *Abstract of Chronology*, he could not refrain from again dragging in Leibniz, now dead for almost a decade, and scolding him for his attempt to embroil him in metaphysical disputes about occult qualities, universal gravity, the sensorium of God, space, time, vacuum, atoms, the perfection of the world, supramundane intelligence. As a parting shot, Newton magisterially slammed down the lid on all those who would impugn his religious faith and ensnare him in the babblings of vain philosophy: 'I hope that these Things, and the perpetual Motion, will be the last Efforts of this Kind.'⁵³

⁵³ *Philosophical Transactions of the Royal Society*, xxxiii (1725), p. 321; also Yahuda MS. 27, fol. 4^r.

IV

PROPHECY AND HISTORY

AFTER Newton's death, his library was acquired by John Huggins, the notorious warden of the Fleet Prison. A catalogue drawn up at the time of the purchase has provided us with an incomparable guide to the intellectual influences that played on Newton's mind, for he was not a man to spend money on books he did not read. This catalogue also bears an entry about five volumes excluded from the sale—books that has notes of Sir Isaac Newton'. Along with an interleaved *Optics* and Descartes's *Geometria* and *Secrets Reveald'i: or an Open Entrance to the Shut-Palace of the Kings*, there is a 'Bible with service Dirty and leaf wanting 1660'.¹ Many other books from the library have been tracked down, but to my knowledge this Bible has not. If it should ever be discovered, its marginalia may yet reveal secrets of Newton's religion that now elude us. But even in the absence of so intimate a witness to his daily devotions, it is evident from the phenomena—the piles of manuscripts he left—that studying this book was Newton's worship. He knew it as few theologians did, and he could string out citations like a concordance.

A man who was conscientious and probed for the truth of Scripture to its innermost depths would be rewarded with 'assurance and vigour' to his faith and a steady satisfaction to the mind 'which he onely can know how to estimate who

¹ London, British Museum, Add. MS. 25424, 'Huggins' List'. A version has been published in Richard de Villarui, *Newton: the Man* (London, 1931), pp. 62–110. The full title of *Secrets Reveald'i*, a pseudonymous work, is *Secrets Reveald'i: or an Open Entrance to the Shut-Palace of the King Containing, The Greatest Treasure in Chymistry, Never yet so plainly Discovered, Composed by a most famous Englishman, Styling himself Anonymous, or Eryraenus Philaletha Cosmopolita: Who, by Inspiration and Reading, attained to the Philosopher Stone at his Age of Twenty three Years, Anno Domini, 1645* (London, 1669).

shall experience it', a religious contentment that Newton described in those very words.²

Though the study of the Old and New Testaments was Newton's primary form of devotion, to the virtual neglect of most other religious ceremonies, his was not the bibliolatry of traditional Judaism or the precisianism of a Puritan. Newton's religion betrayed differences, as well as profound psychic similarities, with these other scriptural religions. In the course of his lifelong pondering of the texts of the Bible in English, Latin, Greek, and sometimes Hebrew (a language he could use with the aid of a dictionary), in print and in rare manuscripts, Newton came to distinguish rather sharply between two types of books in the Biblical canon: those that were narrative-historical and those that were direct prophecy, the word of the living God. By his middle years Newton had come to believe that Biblical descriptions of historical events were written for the most part by contemporaries of those events, men of extraordinary virtue and reliability. They might be prophets themselves—Moses, Samuel, Gad, Ezra—or apostles of prophets like Joshua and Christ's disciples. And in addition to depicting what they saw with their own eyes, they had sometimes assembled materials about the immediate past drafted by their equally trustworthy predecessors. Only one case was truly exceptional, that of Moses, who had access to the most ancient records of all time, known as the Law of God and the Book of Generations. Newton's full account of what had happened to the narrative sections of the Bible over the centuries allowed for many later redactions and for losses and restorations, most of which he investigated with reasonably critical instruments.

Before arriving at his rather heterodox conclusions about the authorship of some of the books of the Bible, Newton had clearly been exposed to the new Biblical criticism. That he read Richard Simon is certain, that he knew Hobbes is very likely; and there is even a good possibility that he may have perused Spinoza's *Tractatus Theologico-Politicus* soon after its appearance, rare in England in the early 1670s. We know that a copy was in Isaac Barrow's library, which Newton

² Yahuda MS. 1. 1, fol. 2^r. See Appendix A below, p. 108.

helped put in order in 1677 after Barrow's death—the catalogue is in the Bodleian³—and to which he had always had free access.

Departure from the tradition that every word in the books of Moses was written by Moses himself did not, however, lead Newton to denigrate the worth of the Old Testament histories. On the contrary, he held them to be far superior to any ancient history the Gentile nations had to offer, for the basic texts had been preserved relatively intact through regular weekly readings in the synagogues of the Jews. Though even these canonical histories had not entirely escaped the ravages of time, they were far more dependable than Greek, Persian, Chaldean, and Phoenician compilations, and, where sources contradicted one another, the Judaic were always to be preferred.

Newton's approach to the historical narratives of the Old Testament was similar to that of Joseph Kimchi and Abraham Ibn Ezra, medieval commentators highly respected by the major Christian Hebraists of seventeenth-century England, whose writings Newton had studied with great care. Abraham Ibn Ezra tended to adopt the commonsensical reading dictated by the natural word order and the ordinary rules of grammar. Newton followed suit and generally accepted the plain meaning, though he permitted himself free historical commentary on the background of events, learned either from geography—he had edited Varenus—or from pagan histories and chronologies. And sometimes he went even further. To extract the fullness of meaning from the Biblical narratives he used the techniques of reasoning-on-the-evidence developed in the lawcourts and in humanist scholarship. Occasionally he glanced at translations and with the aid of friendly scholars searched for alternative meanings of key words in Aramaic and Arabic. With a learned apparatus at his disposal, he vexed the texts to eliminate those inconsistencies and improbabilities that, despite the Bible's excellent state of preservation, had crept in over the years.

³ Bodleian Library, MS. Rawlinson D 878, fols. 33–59: 'A Catalogue of the books of Dr. Isaac Barrow sent to S. S. by Mr. Isaac Newton Fellow of Trin. Coll. Camb. July 14, 1677; obit Dr. Barrow Martii 4, 1677.'

Since the narratives in Scripture were evidently an amalgam of excerpts from lost histories, minor corruptions could be accounted for without calling into question the over-all credibility of the Bible as the best available ancient history of mankind.

While Newton depended for the most part on eminent Christian Hebraists—there are frequent citations from Selden, Dionysius and Gerard John Vossius, Lightfoot, Pocock, Buxtorf—he always managed to give a cast of his own to any commentary. The narrative Bible histories, for example, became a literary support for the astronomical proofs of his revision of world chronology, which sliced some 500 years off the traditional antiquity of the Greeks and ensured the uncontested priority of Israel's civilization, a priority that brought the Jews closer to the divine source. Newton's criticism of the narrative books of the Bible was matter-of-fact and commonsensical probing for evidence, neither Pyrrhonic in its scepticism about what most men considered admissible historical testimony, nor gullible to the point of crediting every statement without examination. Though Newton never went as far as Spinoza in blatantly asserting that the Old Testament was a book on political and moral conduct composed for a particular people at a given moment in time and framed primarily for their needs—to teach them obedience to authority—in practice he read the narrative sections of the Old Testament as human history recorded as it had been enacted by men capable of willing good and evil, though under the constant guidance of a Providence and with frequent interventions on His part.

But for Newton there were other books of Scripture—especially the Book of Daniel and the Revelation of John—whose character was entirely different from that of the narratives. These books of prophecy were unique, set apart from the rest of the Bible because they did not speak the language of ordinary men, as had Moses, Samuel, and Ezra when they wrote history as it actually happened, in Leopold von Ranke's manner. The language of prophetic writings was symbolic and hieroglyphical and their comprehension required a radically different method of interpretation. The prophecies

were God's direct revelations of hidden truths, and Newton wrestled with the meaning of these books from early manhood until his death.

What was Newton's conception of a prophet? It flatly excluded all enthusiasts, ranters, men who spoke with tongues. England's experience with the Fifth-Monarchy men made academic interpreters of prophecy during the Restoration suspicious of sudden illuminations. The wild, ignorant mechanics possessed with the spirit were false prophets, devil-inspired abominations. Newton's revulsion at the outpourings of fanatic enthusiasts of the Civil War period equalled that of Henry More and the Christian Hebraist John Spencer of Cambridge, who wrote angry polemics against them.⁴

The true prophet was defined for Newton, as for other respectable Anglicans, by the writings of Maimonides, whose anti-mystical works were highly esteemed. Portions of his commentaries on the Mishna had been translated into Latin (with the Arabic text printed in Hebrew characters) by Edward Pocock of Oxford in the *Porta Moisi* (1655), and the substance of the rest of his vast body of work was communicated to the learned world by John Spencer in a magnificent, 500-page analytic compendium of Maimonides' writings in Latin, which bore a title that had best be translated as *Explanation of the Laws of the Hebrews*.⁵ The Anglicanized 'prophet' of Maimonides was immensely learned, of impeccable moral virtue, a man who had devoted himself to years of study, and who when properly prepared was the perfect vehicle for God's word. For Maimonides, More, Spencer, and Newton, the true prophet was a supremely rational man, a man worthy of receiving a message from the Divine Reason through the agency of the prophetic spirit. Nothing would have been more alien to their conception of

⁴ See, for example, Henry More, *Enthusiasmus Triumphatus* (1662) and *Antidote against Atheisme* (1656), and John Spencer, *A Discourse concerning Vulgar Prophecies wherein the vanity of receiving them as the certain indications of any future Event is discovered; and some Characters of Distinction between true and pretending Prophets are laid down* (1665).

⁵ John Spencer, *De Legibus Hebraeorum ritualibus et earum rationibus* (Cambridge, 1685).

the ancient prophet than the distraught mystic running naked through the streets of Jerusalem that Voltaire later conjured up. The prophet was a religious teacher who had been favoured and chosen by God because of his hard-won rational perfections, not his unbridled flights of fantasy.

It was the language of prophecy that was obscure and veiled; the mind of the prophet was pellucid in its clarity, precise and parsimonious in its expression of the Holy Spirit. The meaning of prophecy was concealed, as were the laws of nature, that other book in which God had written a record of his actions; and Newton drew frequent parallels between unravelling the mysteries of the books of prophecy and discovering the secrets of the Book of Nature. That the complete content of prophecy had been hidden until the seventeenth century was for Newton 'nothing but what ought to have been'.⁶ And perhaps with a touch of circularity he reasoned that the very circumstance of his revealing in his commentaries the fullness of prophecy was no mean sign that the consummation of the times was not far distant.

It is understandable that men like Newton should turn to Daniel and John as the preferred prophets—their enigmatic symbols and images were a challenge, the baffling episodes and visions demanded explanation. As long as the cryptic books remained sealed, what had men really uncovered in Scripture? God's communication of these words to two chosen prophets was a historical act that made no sense whatever unless it was intended that their meaning would ultimately be deciphered. 'If they are never to be understood, to what end did God reveale them?';⁷ Newton asked in a manuscript of the early Cambridge period.

Demonstration that prophecies and other divine promises had in fact been fulfilled in the historical world was one of the most ancient and enduring apologies for Jewish and Christian religion; but it is still difficult for some of us to appreciate the continued fascination of great European intellects of the seventeenth and early eighteenth centuries with the interpretation of Daniel and the Apocalypse. In

⁶ Yahuda MS. I. 1, fol. 1^r. See Appendix A below, p. 107.

⁷ *Ibid.*

retrospect this absorption now appears as the swansong of an expository tradition that produced hundreds of volumes and had an uninterrupted existence going back to the early centuries of Christianity. With the triumph of the *philosophes*, this type of literature, though it increased in quantity, became the refuge of cranks and an occasional poetic or artistic genius. In the seventeenth century it was still at the core of the religion of a scholarly divine. Time and again Newton warned of the perils of neglecting the study of the prophecies, quoting the words of Jesus: 'Ye Hypocrites ye can discern the face of the sky but can ye not discern the signes of the times?'.⁸ Without the guidance of prophecy, how would men recognize Antichrist? Prophecy interpretation was no idle speculation, no matter of indifference, but a duty of the greatest moment. 'Wherefore it concerns thee to look about thee narrowly lest thou shouldst in so degenerate an age be dangerously seduced and not know it. Antichrist ~~was~~ to seduce the whole Christian world and therefore he may easily seduce thee if thou beest not well prepared to discern him'.⁹

I wonder whether anyone in our times has really mastered the whole of the mammoth corpus of Judaic expositions of Daniel and Christian expositions of Daniel and the Apocalypse from the beginning to the end. An academic history of this form of knowledge illustrating changing techniques, devices, and fashions in interpretation through the ages is another of those enterprises that I leave to posterity without much regret. But even now one can say something about the state of prophecy interpretation at the time Newton was engaged upon it. Many of the scientists and apologists of science in Newton's circle, among whom Edmund Halley was a notable exception, tried their hands at the exposition of prophecy, and the number of such works composed in England during Newton's adult life is staggering; as the Age of Reason dawned, seventeenth-century manuscript expositions of the Apocalypse in Oxford University libraries alone bear witness that there was still more than one way of seeking

⁸ Yahuda MS. I. 1, fol. 2^r. See Appendix A below, p. 108.

⁹ Yahuda MS. I. 1, fol. 3^r. See Appendix A below, p. 109.

enlightenment. Though no royal society existed for the exchange of ideas on the subject, there are detailed reports of Newton's discussion of these books in 1680 with Henry More (who showed him his own writings on the Apocalypse and Daniel before their publication), and of conversations with Fatio de Duillier, John Locke, and Richard Bentley in the 1690s, with William Whiston in 1707, with Samuel Clarke, Brook Taylor, and sundry erudite bishops. Contemporary memoirs and letters are unanimous in portraying Newton's dogged obstinacy in sticking to his own interpretations despite the criticism of his friends. Henry More at first thought that he had convinced his young colleague, and Newton's countenance seemed to him 'transported' by what More called the mathematical evidence of his exposition; but then Newton lapsed into his former conceits. Bentley offended Newton by asking him to prove the self-evident truth that a day in prophecy meant a calendar year, and as a consequence there was a breach in their relations for a time. Whiston in his turn was unreceptive to Newton's four-hour geographic and chronological disquisition on the four monarchies in Daniel because he thought himself superior in scriptural interpretation, though admittedly inferior in mathematics. As for Fatio, Newton gently chided him early in their relationship for giving way too readily to mystical fancies, whereas Newton's readings of prophecy always had impeccable warranties in Scripture.

In the world of the English academic expositors, something resembling a Copernican revolution had taken place earlier, in the decade between 1628 and 1638—the invention of a novel interpretive system by Joseph Mede of Christ's College, Cambridge. Almost all of the respectable expositors of the Restoration relied upon his fundamental innovating methods. This most remarkable of English expositors had apparently routed his rivals Henry Hammond and the great Hugo Grotius. Newton was invariably more generous to dead than to living predecessors, and he paid his respects to Mede in unwontedly strong terms, considering himself to be the next qualified interpreter after him.¹⁰ As the Master of Balliol has

¹⁰ Yahuda MS. I. 1, fol. 15^r. See Appendix A below, p. 121.

shown, the impact of Mede's work is visible throughout the seventeenth century on all social levels;¹¹ it can be detected among uneducated Fifth-Monarchy men, who acquired his doctrines through intellectual seepage, as well as in the scholarly writings of Henry More and William Whiston.

I do not know whether Newton ever read Worthington's essay on the crucial significance of the interpretation of prophecy and his analysis of the true method, which prefaced Mede's collected works, enlarged and republished in 1664, a few years after Newton went up to Cambridge.¹² But Newton's manuscripts constantly echo the same sentiments with respect to the pivotal role of prophecy interpretation for a Christian who wanted to advance beyond milk for babes. To interpret prophecy was a grace and favour of God comparable to prophecy itself. Random enthusiastic evocations, inspired by the verses, were to be sedulously avoided. For centuries prophecy interpretation had in effect been *fluid*, free association; but Mede now demanded congruence in the exposition of its various parts. The scientific spirit began to emerge in Mede, was strengthened in More's use of mathematical language, and reached its apogee in Newton's system of interpretation. John Napier, an earlier example of the symbiosis of mathematics and prophecy, is somehow never mentioned by Newton, despite the reprinting of his works during the Civil War.

In addition to Mede's great erudition, his learned references to treatises on symbols and ancient Indian and Arabic dream-books, his reputation rested upon the introduction of a totally new technique in manipulating prophetic texts. The historical events foretold by the images in the Apocalypse did not parallel the order of the visions themselves chapter by chapter. A system of synchronisms had to be invented to determine the right chronological sequence (confused in the original books). Mede had discovered that visions which were 'synchronal' and 'homogeneous' were dispersed here and there throughout the text; in identifying and

¹¹ Christopher Hill, *The World Turned Upside Down* (London, 1972), p. 77.

¹² Joseph Mede, *Works*, corrected and enlarged according to the Author's own manuscript [by J. Worthington] (London, 1664-65), 2 vols.

regrouping them preparatory to interpretation, he had come upon a method that his admirers glorified as equal in importance to Aristotle's syllogistic reasoning. (From all appearances, Mede would have been at home with modern structuralists.)

Newton was heir to Mede's method, and he began working along these lines as early as the 1670s; even in the sixties there is a record of his purchase of Sleidan's *Four Monarchies*, a world history based on Nebuchadnezzar's dream in the Book of Daniel. Prophecy interpretation is central in Newton's non-mathematical writings. If one passes in review the whole body of his theological and chronological works, it appears that many grew out of an initial absorption with Daniel and the Apocalypse, that they were offshoots from one main trunk, the books that held the ultimate secret, the history of the world condensed into a series of visions. In arranging Newton's manuscripts after his death, John Conduitt already perceived that the *Chronology of Ancient Kingdoms Amended*, which covers world history from the earliest beginnings, when joined and connected with Newton's history of empires and churches since Daniel, forms one complete, universal history of mankind, both sacred and profane, since the Creation.¹³ It is not mere chance that folios on the emendation of ancient chronology are intermingled with drafts of prophecy interpretation. A piece on the Temple of Solomon, for example, which is now a chapter in the published *Chronology*, was originally undertaken in order to explain the vision of the Temple in the Apocalypse. To decipher the prophecy, the structure had to be re-created with meticulous accuracy, its ground-plan and equipment laid out, because every detail was a prefiguration. The only forthright commitment to the idea of progression that I have been able to discover in Newton involves the size of the Sanctuary of God, whose linear measurements, according to Newton's careful computations, doubled from the Tabernacle under the Judges to the Temple under the Kings; and similarly the dimensions of the new Jerusalem under the King of Kings would be double that of royal Jerusalem. With the force of inevitability

¹³ Cambridge, University Library, Add. MS. 3967, fol. 123r.

the quantitative expression of superiority was taking possession of the holiest of holies.¹⁴

There are additional reasons for the interlocking of Newton's chronological and prophetic researches. Radical revisions in chronology were needed to establish absolute benchmarks against which to verify the fulfillment of prophecy. If traditional chronology was inaccurate, how could one ever expect to try a prophet? If the birth of Christ and the Crucifixion in the accepted system were in error by years or even months, how could one judge the correctness of reckonings of future events for which these dates were points of reference?

During his Cambridge period, Newton prepared several drafts of what were entitled 'Rules for interpreting the Apocalypse' and 'The Language of Prophecy', with numbered items. Some pieces used formal scientific headings like 'Propositiones' and 'Lemmata'. But one can bypass many of the details of this methodological framework, which are perhaps more appropriate subject-matter for the thorough training of a latter-day expositor of prophecy than for a public lecture, to arrive at the general spirit of Newton's work and his manner of reasoning.

Prophecy interpretation required a series of operations, no one of which was to be performed casually or sloppily, any more than a scientific experiment should be. The stages as I describe them do not represent Newton's actual procedure—his working-out of the grand design year by year may some day be reconstructed, though not by me—but elements in the total process can be isolated, even though he was engaged in some of these operations simultaneously or in a different order.

One step involved the establishment of unimpeachable texts for Daniel and the Apocalypse, the Masoretic Hebrew and Aramaic for the former, the Greek for the latter. In the Jerusalem archive there is a closely written notebook of Newton's that contains variant readings of the Apocalypse,

¹⁴ Wellfleet, Mass., Babson Institute Library, No. 434: Newton, 'Prolegomena ad Lexici Prophetici partem secundam, in quibus agitur De forma Sanctuarii Judaici . . . Commentarium', drawing of the ground-plan of the Temple of Solomon. See also Appendix B below, p. 135.

verse by verse, gathered together from every conceivable manuscript and printed edition he could lay his hands on.¹⁵ From Newton's correspondence with the Biblical scholar John Mill, it is evident that this particular compilation was already complete and in final form in 1694;¹⁶ Newton had of course already been drafting general commentaries on prophecy in the 1670s and 1680s.

In another stage, Newton worked out a dictionary of historical, political, and ecclesiastical equivalents for the images and symbols in prophetic literature. His presumption was that prophecies were congruent in all their parts without fault or exception. Once an appropriate political translation of any given 'prophetic hieroglyph' (the phrase is Newton's) had been determined, that same meaning had to apply whenever it appeared in a book of prophecy. The tests of truth were constancy and consistency.

This type of hieroglyph reading and its reverse—inventing new hieroglyphs to represent ideas, persons, or deeds—were very much in fashion. Such activities, which had been carried on since the ancient Greeks, reached a zenith in the baroque world. There were many counterparts in the general culture of Europe to what Joseph Mede and Isaac Newton were doing in prophecy interpretation. Books of emblems and iconology were manuals of instruction prescribing standard artistic representations for abstract virtues and vices, philosophical ideas, characters and humours, continents, callings, and statuses. The compendia of Natalis Comes and Cesare Ripa and especially of Vincenzo Cartari, with which Newton was quite familiar, were the most popular of the type. And in fact Newton himself, when he was Master of the Mint, designed with his own hand a number of emblems for coins commemorating historical events.

The euhemeristic interpretation of pagan mythology, the tendency of historian-mythographers to discern in every classical myth a kernel of ordinary political history related to the obscure period before the great classical historians began to write, was common in the seventeenth and eighteenth

¹⁵ Yahuda MS. 4.

¹⁶ Newton, *Correspondence*, iii. 305-7, John Mill to Newton, 21 Feb. 1694.

centuries. Newton used this euhemeristic method constantly in his papers on world chronology to extract from myths a reasonable, consecutive account of the early ages of mankind before any records were kept. In the interpretation of prophecy he adopted fundamentally the same method as the euhemerists and iconologists, treating the visions of the Apocalypse as if they were mythic speech and translating their symbols into political actors and events. But if as a mythographer Newton was derivative, the elaboration of a complete lexicon of scriptural prophecy, a dictionary of prophetic symbols, so to speak, was his own achievement. One of his manuscripts on the language of the prophets outlines the objects mentioned in the Apocalypse and painstakingly arranges them in a grand, orderly chain of being from the heavens through things terrestrial, ending with images of men and women 'in various circumstances', as Newton prosaically remarked, 'as with a crown or on horseback, or with a sword or bow, or with weights and measures or clothed in white or in other apparel or naked, or holding a cup of wine or drinking it, or with a wound or sore or in pain, or pained in child-birth, or bearing a manchild: and of the death of man or beast, and of worshipping them and their images'.¹⁷ Each of these objects or persons and the attributes with which they were endowed or the actions in which they were engaged had concrete equivalents in the political world: cherubim meant armies, sealing meant the heathen custom of marking believers with a sign of their god, the eagle was a Roman legion, a dragon a Roman company, and of course the Whore of Babylon was the Papacy.

For Newton, this language of prophecy, in which objects beheld in visions stood for political and religious entities, was not a special, coded speech invented solely by Daniel and John. Such hieroglyphic expressions had a resemblance to the system of symbols common to many Eastern nations and to the ancients in general. Newton was fumbling with an idea that Giambattista Vico was soon to develop into one of the primary themes of his philosophy of history: that the earliest

¹⁷ Yahuda MS. 9. 1, fol. 4^r.

peoples expressed themselves in symbols and poetic speech, not in ordinary prose. Vico sent Newton a copy of the first edition of the *Scienza Nuova* of 1725 through a rabbi in Livorno; but if it ever arrived, it was probably too late for Newton to have consulted it.

Lest Newton's scientific method of interpreting prophecy sound abstruse and involuted, let me illustrate it with an Apocalyptic creature who figures prominently in the Jerusalem manuscripts—the frog. John saw issuing from the mouth of the dragon and from the mouth of the beast and from the mouth of the false prophet three foul spirits like frogs.¹⁸ Newton concluded that whenever John wrote 'frogs' in the Apocalypse, he meant papal idolaters and idolatrous practices. According to Newton's system, the term frogs applied both to demons and to their victims, the societies of Christians whom they seduced into idolatry by preaching falsehoods and working factitious miracles. But how did Newton deduce this? What were the proofs? He marshalled the evidence from a wide range of sources. He did not for a moment pretend that in all the authorities he consulted, frogs were identical with devils and devils with idolaters. But he showed that there was a general consensus about the similarity between the characteristics of frogs and the characteristics of devils and false teachers and vain babblers, everything that idolaters represented. To substantiate his generalization Newton quoted seriatim Artemidorus' famous book on dreams to the effect that frogs in dreams signified impostors and scoffers; the assertion of the sixteenth-century commentator Benedictus Arias Montanus that unclean and loquacious animals stood for false prophets; Hugo Grotius, his rival interpreter, in the same vein; Origen's denigration in his *Homily on Exodus* of poets, who 'with an empty and vain-glorious cant as with the noise and song of frogs have introduced fables into the world'; Aristotle, who said that 'they whose sides are turgid and as it were blown up are loquacious and foolish babblers and are referred to frogs'; Joannes Tzetzes, commenting on Aristophanes' play *The Frogs*, that frogs are garrulous and senseless; and finally Ovid's

¹⁸ Revelation 16: 13. The Vulgate reads 'in modum ranarum'.

fable that the Lycians were turned into frogs for railing at Latona.¹⁹ One is tempted to cry: *Quelle galère!* But who has not seen hypotheses sustained with far scantier evidence? Since so many impeccable authorities ancient and modern were agreed in imputing to frogs the vilest qualities of dirty impostors and empty babblers, whom else could John have meant by frogs but idolaters, and who are the bearers of modern idolatry if not the Popists? To point out similitude in some striking respects is to establish identification—a manner of thinking from which we are not as emancipated as we pretend.

Once the political equivalents for all the physical word-images in the prophecy had been discovered and fixed, Newton proceeded to read the synchronized visions of prophecy as straightforward narratives of dated events in the history of empires and religious institutions since the age of Daniel, which he set in the second century before Christ. To work out the chronology of political and religious crises, the turning-points in world history such as the barbarian invasions, the establishment of papal hegemony, the birth of monkey, he had recourse to standard Greek and Roman histories, and books such as Carlo Sigonio's *Historiarum de occidentali imperio libri xx*, Caesar Baronius' *Annales Ecclesiastici*, and the works of Arias Montanus, supplemented by the Church Fathers and histories of heresies and persecutions. As he reached modern times, Newton availed himself of the most varied sources without prejudice; in a reference to Florentine history, he could even say with shocking approval: 'Well wrote Machiavell.'²⁰ With the assistance of these classic works Newton could prove, point by point, that everything foretold in the prophetic books had actually taken place, that the correspondence between prophecy and recorded history had been perfect.

Newton applied what might be called scientific criteria to the interpretation of the books of prophecy, particularly the law of parsimony. He showed not only that every notable political and religious occurrence conformed exactly to some vision in prophecy, but that his set of equivalents had totally

¹⁹ Yahuda MS. 9. 1, fol. 25^r.

²⁰ Yahuda MS. 7. 1, fol. 31^r.

exhausted the possible meanings of each of the objects and images appearing in any prophetic verse. There was nothing left over, no random words still unexplained, no images that were superfluous. The system was enclosed, complete, and flawless. Newton saw his 'methodising of prophecy' as an ideal scientific structure, exhibiting the greatest possible simplicity and harmony. His rules for interpreting the language of prophecy were a replica of those he insisted upon for interpreting the Book of Nature. With obvious self-satisfaction he surveyed his results as a perfect embodiment of the same guiding principle in both natural philosophy and prophecy: 'To choose those constructions which without straining reduce things to the greatest simplicity.'²¹

Newton was as certain of his method and results in the interpretation of the Apocalypse as he was in the *Principia*, and he uttered thinly veiled threats against those who might be rash enough to contradict him. In all likelihood their motive was not to understand prophecy but to 'shuffe it of', to befuddle the minds of men and not to instruct them.²² Newton hurled a challenge:

Hence if any man shall contend that my Construction of the Apocalyps is uncertain, upon pretence that it may be possible to find out other ways, he is not to be regarded unless he shall show wherein what I have done may be mended. If the ways which he contends for be less natural or grounded upon weaker reasons, that very thing is demonstration enough that they are fals, and that he seeks not truth but the interest of a party. And if the way which I have followed be according to the nature and genius of the Propheesy there needs no other demonstration to convince it. For as of an Engin made by an excellent Artificer a man readily belevies that the parts are right set together when he sees them joynt truly with one another notwithstanding that they may be strained into another posture; and as a man acquiesces in the meaning of an Author how intricate so ever when he sees the words construed or set in order according to the laws of Grammar, notwithstanding that there may be a possibility of forcing the words to some other harsher construction: so a man ought with equal reason to acquiesce in that construction of these Prophesies

²¹ Yahuda MS. 1. 1, fol. 14^r. See Appendix A below, p. 120.

²² *Ibid.*

when he sees their parts set in order according to their suitableness and the characters imprinted in them for that purpose.

It is true that an Artificer may make an Engin capable of being with equal congruity set together more ways than one, and that a sentence may be ambiguous: but this Objection can have no place in the Apocalyps, because God who knew how to frame it without ambiguity intended it for a rule of faith.²³

Newton's posthumously published *Observations upon the Prophecies of Daniel, and the Apocalypse of St. John* stops short of predicting the future. In his later years Newton cautiously avoided the trap into which activist millenarians had stumbled in their attempt to fix precise dates. There is even a passage in which he attacked those given to prognostication, for while the books of prophecy were the history of things to come, they could be understood by mere mortals only after the events prophesied had actually occurred. But in private in his Cambridge days, a younger Newton had made many conjectures about the approximate time of the Second Coming of Christ, proposing terminal dates that depended on calculating when the reign of the papal Antichrist had been initiated. One could then begin to count off the crucial 1,260 years of Daniel's 'time times and half a time'. In his notes Newton was quite specific. The reign of Antichrist had started 'about the time of the invasion of the Barbarous nations and their erecting severall Kingdoms in the Roman Empire, and had wec nothing more then this it were sufficient to ground an expectation that the prevalency yet to come of Popery cannot continue long; it being certain that 1200 of the 1260 years are run out already'.²⁴

There are other manuscripts written during his Cambridge years in which Newton did not hesitate to indulge in broad speculations about what the millennium and the kingdom of heaven would be like when they were finally inaugurated. His eschatology is set forth with a magnificent profusion of pictorial detail in one long section of a Jerusalem manuscript entitled 'The end of the world day of judgment and world to come', which I have tentatively dated to the 1680s. It is

²³ Yahuda MS. 1. 1, fols. 14^r, 15^r. See Appendix A below, p. 121.

²⁴ Yahuda MS. 23, fol. 6^r.

clearly finished copy, of which there are parallel, perhaps earlier, drafts in the usual truncated state. This extensive text—and I do not pretend to cover its many controversial assertions that polemize with Henry More by implication, though his name is not mentioned—proves beyond question that Newton's world-view in the decade when the *Principia* was composed admitted of a far greater diversity of beings than those recognized by positivist physical scientists and nineteenth-century Unitarians. Newton envisaged the co-existence during the millennium of beings of different natures, some mortal, others spiritual and invisible, the children of the resurrection—a condition no stranger, he said, than what obtained in the present everyday world. On the mode of their converse he was quite specific.

But you will say how then comes it to pass that in the thousand years there are Mortals on earth? . . . Doth the earth last after the day of judgment, and do mortals live on it, and do the Sons of the resurrection live among them like other men and reign over them in the beloved city? I answer that its true the beloved city is a city of mortals, and I say further that the glorious description of the new Jerusalem under the types of precious stones and pearls is a commentary upon this City. . . . But to conceive that the children of the resurrection shall live among other men and converse with them daily as Mortals do with one another, and reign over them after the way of temporal kingdoms is very absurd and foolish. Do Men convers with Beasts and Fishes, or Angels with men?²⁵

It would surely not be beyond the power of God in the millennium to create beings who made only occasional epiphanies to men. The bodies of the 'children of the resurrection' would be like Christ's, visible only at times. 'Such as is his body, such shall ours be', wrote Newton, with more than a touch of self-assurance that he would be among those 'children of the resurrection'.²⁶ The spirits of just men would be made perfect, and for them the new Jerusalem signified

²⁵ Yahuda MS. 9. 2, fol. 138^r; Yahuda MS. 6, fols. 12^r-19^r, 'Of the Day of Judgment and World to come', which appears as Appendix B below, pp. 126-36, presents an alternative version, in more compact form, of some of the ideas expressed in Yahuda MS. 9. 2, fols. 123^r-170^r.

²⁶ Yahuda MS. 9. 2, fol. 138^r.

not only a 'local city on earth' but 'the whole assembly of Christ and his Angels with the Saints raised from the dead and reigning with him in heaven'.²⁷

And where would the heavenly city be situated? Newton alternates sceptical ignorance with untrammelled flights of imagination.

If you ask where this heavenly city is, I answer, I do not know. It becomes not a blind man to talk of colours [a metaphor, repeated in the General Scholium, to suggest the limitations of human knowledge]. Further then I am informed by the prophesies I know nothing. But this I say that as fishes in water ascend and descend, move whether they will and rest where they will, so may Angels and Christ and the Children of the resurrection do in the air and heavens. 'Tis not the place but the state which makes heaven and happiness. For God is alike in all places, He is substantially omnipresent, and as much present in the lowest Hell as in the highest heaven, but the enjoyment of His blessings may be various according to the variety of places, and according to this variety he is said to be more in one place less in another, and where he is most enjoyed and most obeyed, there is heaven and his Tabernacle and Kingdom in the language of the Prophets. We usually conceive it to be above.²⁸

In this manuscript Newton gave expression to a theology of glory in effusive language. There was genuine, almost rhapsodic, wonderment at the complex and infinite powers of the Creator.

As all regions below are replenished with living creatures, (not only the Earth with Beasts, and Sea with Fishes and the air with Fowls and Insects, but also standing waters, vineger, the bodies and blood of Animals and other juices with innumerable living creatures too small to be seen without the help of magnifying Glasses) so may the heavens above be replenished with beings whose nature we do not understand. He that shall well consider the strange and wonderful nature of life and the frame of Animals, will think nothing beyond the possibility of nature, nothing too hard for the omnipotent power of God. And as the Planets remain in their orbs, so may any other bodies subsist at any distance from the earth, and much more may beings, who have a sufficient power of self motion, move whether they will, place

²⁷ *Ibid.*, fol. 139^r.

²⁸ *Ibid.*

themselves where they will, and continue in any regions of the heavens whatever, there to enjoy the society of one another, and by their messengers or Angels to rule the earth and converse with the remotest regions. Thus may the whole heavens or any part thereof whatever be the habitation of the Blessed, and at the same time the earth be subject to their dominion. And to have thus the liberty and dominion of the whole heavens and the choice of the happiest places for abode seems a greater happiness than to be confined to any one place whatever.²⁹

This from a man who virtually never in his life ventured beyond the Woolsthorpe, Cambridge, London triangle!

In such passages Newton successfully communicates his sense of the presence of invisible things and his awed amazement at the plenitude of the creation. His universe is a plenum of spiritual beings, and this may help to account for his opposition to the idea of a material plenum. The man of the melancholy countenance, as Henry More described him, seemed to fancy himself soaring through the heavens. The prospect of moving through vast spaces did not terrify him—they would be filled with a happy throng of saintly companions, as in many a Church Father's description of paradise. And as a child of the resurrection he would not be wholly cut off from mortal men, but through the angels would rule over them and remain in relationship even with the furthestmost extremities of the universe.

Having said all this, Newton issued a kind of disclaimer: 'But the truth and manner of these things we shall not understand before the resurrection. I only speak of the possibility.'³⁰ Newton feigned no hypotheses and he never wove fancies—that was the official stance. And he had a way of holding himself aloof from his own visions and even partially retracting them. The dream of beatitude was only a possibility, he cautioned. Alas, in the manuscripts of his late London period I find no poetic transports. When the ageing Newton was an administrator of British science and Master of the Royal Mint, he copied and edited and abstracted and emended his apocalyptic interpretations of earlier years, until they turned into an arid chronicle of political and ecclesiasti-

²⁹ *Yahuda MS.*, 9. 2, fol. 140^r.

³⁰ *Ibid.*

cal events. The founts of creativity had dried up in science and in religion.

Newton's statement of fundamental religious principles, his interpretation of prophecy, his textual criticism of the historical works of Scripture, his system of world chronology, his cosmological theories, and his euhemeristic reduction of pagan mythology all bespeak the same mentality and style of thought. If nature was consonant with itself, so was Isaac Newton's mind. At the height of his powers there was in him a compelling drive to find order and design in what appeared to be chaos, to distil from a vast, inchoate mass of materials a few basic principles that would embrace the whole and define the relationships of its component parts. Newton could not rest content with merely contemplating the sheer variety and multiplicity of historical events, any more than he could a world of disparate observations about nature. In whatever direction he turned, he was searching for a unifying structure. He tried to force everything in the heavens and on earth into a grandiose but tight frame from which the most minuscule detail could not escape.

All of Newton's studies were animated by one overwhelming desire, to know God's will through His works in the world. For myself, I have come to believe that the fervour of Newton's quest for a knowledge of God was related, as I proposed at the beginning of these lectures, to a psychic quest for his own father. Such assertions are not demonstrable in accordance with the accepted canons of historical evidence. But perhaps the canons themselves now stand in need of some revision. In attempting to recapture a past religious experience, either we have to be open to psychological analogies and covert meanings, or else we must restrict ourselves to mere descriptions of religious conduct and the analysis of rationalist theological arguments in written expositions—in which event an inquiry into the religion of Isaac Newton would be an impoverished exercise indeed.

In concluding these lectures I would like to revert once more to Newton's religious credo. In a fragment buried away in his church history, he proclaimed his submission to the Father. It is not highly original in its thought or in its

expression of religious emotion; but as a confession of personal faith it has a simple authenticity.

APPENDIXES

We must believe that there is *one God* or supreme Monarch that we may fear and obey him and keep his laws and give him honour and glory. We must believe that he is the father of whom are all things, and that he loves his people as his children that they may mutually love him and obey him as their father. We must believe that he is *πατριάρχης* Lord of all things with an irresistible and boundless power and dominion that we may not hope to escape if we rebel and set up other Gods or transgress the laws of his monarchy, and that we may expect great rewards if we do his will. We must believe that he is the God of the Jews who created the heaven and earth all things therein as is expressed in the ten commandments that we may thank him for our being and for all the blessings of this life, and forbear to take his name in vain or worship images or other Gods. We are not forbidden to give the name of Gods to Angels and Kings, but we are forbidden to have them as Gods in our worship. For tho there be that are called God whether in heaven or in earth (as there are Gods many and Lords many) yet to us there is but one God the father of whom are all things and we in him and one Lord Jesus Christ by whom are all things and we by him: that is, but one God and one Lord in our worship.³¹

³¹ Yahuda MS. 15. 3, fol. 46r.