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Isaac Barrow: divine, scholar, mathematician

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The education of a scholar

Isaac Barrow appears to have descended from an ancient Suffolk family, but his immediate ancestors were professional men from Cambridgeshire. His great-grandfather was Philip Barrough, author of the popular *Methode of physicke* (1583) and a licentee by Cambridge University to practice chirurgery and medicine in 1559 and 1572, respectively. Philip's brother, Isaac, was elected a scholar of Trinity College, Cambridge, in 1560 and fellow the following year, graduating M.D. in 1570. He is said to have been tutor to Robert Cecil, the future lord treasurer, to whose father William, Lord Burghley, Philip Barrough's *Methode of physicke* was dedicated. Two of Philip's sons, Samuel and Isaac, matriculated at Trinity College in 1575 and 1584, respectively, the latter becoming a justice of peace at Cambridgeshire. Of the children of the J.P., Thomas was the father of the master of Trinity College, while his brother – yet another Isaac – was to become the bishop of St. Asaph. In his old age, Thomas Barrow recollected that it was his father's severity that drove him to leave home and acquire a trade instead of following the footsteps of his ancestors into one of the three learned professions. Thus, "he came to London and was apprentice to a linen-draper," rising in due course to become linen draper to Charles I. In 1624, Thomas married Ann, the daughter of William Buggin of North Cray, Kent, who gave birth in October 1630 to Isaac Barrow. It appears that Barrow was the only child of this union – certainly the only child to survive infancy. Ann died c. 1634, and the widowed father sent the lad to his grandfather, the Cambridgeshire J.P., who resided at Spinney Abbey. Within two years, however, Thomas remarried, perhaps – as Osmond speculated – in order to establish a new family home and thus remove young Isaac from the care of his grandfather. As Thomas Barrow told Aubrey years later, he "was
faine to force him away, for there he would have been good for nothing.\textsuperscript{7}\textsuperscript{7} The new wife was Katherine Oxinden, sister of Henry Oxinden of Maydekin, Kent. Obviously, Thomas had married above his station. A somewhat condescending tone toward Thomas is evident in the Oxind\textsuperscript{en} Letters, although the Oxindens were not above making use of the new brother-in-law in both private and business matters. Later, following the outbreak of the Civil War, Barrow and the Oxindens parted ways, for the latter adhered to Parliament side. Of this marriage, at least one daughter, Elizabeth (born 1641), is known to have survived the Restoration, having spent the period of the Civil War and Interregnum with another branch of the Oxinden family at Dean.\textsuperscript{3}

What Thomas missed by defying his father’s wishes and becoming a merchant he compensated for in his attitude toward his son, and from an early age the elder Barrow intended Isaac to become a scholar. To such an end, he made a special arrangement with Robert Brooke, headmaster of Charterhouse, according to which Brooke would be paid double the going rate of £2 p.a. in return for a promise to take special care of young Isaac. The choice of Brooke and of Charterhouse was reasonable, given the school’s reputation for providing a solid classical education that would prepare a young man for university. (Two recent alumni included the poets Richard Crashaw and Richard Lovelace.) In addition, the headmaster was known for his stern Anglican beliefs, sentiments that would cost him his position following the Puritans’ rise to power.\textsuperscript{4} Quite possibly, an additional incentive was the fact that the school’s captain, a kinsman, was expected to supervise Isaac’s education. Such plans, however, backfired, for the above-mentioned kinsman informed Thomas that Brooke was scandalously neglectful of Isaac’s education; if anything, the lad was distinguishing himself as the school ruffian, “being much given to fighting, and promoting it in others.” So much so that his father “often solemnly wished, that if it pleased God to take away any of his children it might be his son Isaac”\textsuperscript{5}\textsuperscript{7}. Thus, after two or three years, Isaac was removed from Charterhouse and transferred to Felsted School in Essex, under the care of its noted schoolmaster, Martin Holbeach.\textsuperscript{6}

Sir John Bramston, commenting in his autobiography on the upbringing of the regicide Sir Henry Mildmay, stated that “from his mother’s woombe and his master’s tuition [Sir Henry] suckt in such principles of disloyaltie and rebellion” that he later became noted for. The master that Bramston was referring to was none other than Martin Holbeach, who, continued the judge, “scarce bred any man that was loyall to his prince.” Such was obviously a biased opinion. True, Holbeach was noted for his Puritan sympathies. He had once “whissked to safety” the celebrated Thomas Shepherd and was ejected from his living in 1662 for Nonconformity. However, one can hardly describe the education he provided for his charges as doctrinaire. Even those Puritan families who entrusted
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Holbeach with the education of their children – and the schoolmaster helped raise all four sons of Oliver Cromwell – had no desire for a solely religious education. Not that they did not seek assurances of Holbeach’s personal piety and Calvinist convictions, which indeed may have been translated into the catechism of the school. However, having ascertained Holbeach’s religious proclivities, what parents sought – and found – in Felsted were stern discipline and solid grounding in classical learning. From all accounts Holbeach was indeed an exceptional teacher and firm disciplinarian. John Wallis, who had been a student of Holbeach a decade before Barrow, stated that in his time there were “above a hundred or six score Scholars; most of them Strangers, sent thither from other places, upon reputation of the School; from whence many good Scholars were sent yearly to the University.” So it is not surprising that Thomas Barrow, in despair over his son’s poor scholastic achievement and unruly character, sent Isaac to Felsted.

The brief description provided by Wallis of the curriculum at Felsted indicates that under Holbeach the school modeled its curriculum – in terms of both structure and depth of study – after such great grammar schools as St. Paul’s and Westminster. Proficiency in Latin and Greek was the main objective, and to such an end the students were intensively drilled both in the rules of grammar and syntax and in the habits of language, and fed a strenuous diet of classical texts adjoined with contemporary helps for study. The Latin and Greek grammars of Lily, Camden, and Farnaby and the dictionaries and lexicons of Stephanus, Pasor, and Schrevell were intended to aid the reading of the classics. Certain phrase books and colloquial exercises were also assigned. Important, and effective, tools employed in the education process were written and oral exercises of double translation, not only from Latin or Greek into English (and vice versa) but also from prose into verse, as well as the opposite. To reinforce such skills, the students were instructed to speak only Latin or Greek, even outside the classroom. Written and oral exercises consisted of orations and epistolary writing imitative of a particular style or purpose. Also, ex tempore declamation that was intended to enhance facility in the spoken tongue – as well ingenuity of improvisation – was widely practiced. It was firmly believed that a rigorous combination of written and oral exercises would not only develop the student’s memory – an important underlying concept in contemporary education – but inculcate in him a refined taste for the best classical masters, whose style could then be imitated. The effectiveness of such techniques was verified by Wallis, who recalled, “I had been used . . . to speak Latin; which made the Language pretty familiar to me; which I found to be of great advantage afterwards.” The upper forms were also taught Hebrew – using the Hebrew Bible and Psalter as textbook, alongside a grammar and a dictionary – as well as elementary French. In order to round off their preparation for university, they were also introduced to logic.
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The chronology of Barrow’s younger years is confused, but it seems that he came to Felsted c. 1640, and stayed for some four years. By 1642, the elder Barrow was facing financial ruin owing to the Irish rebellion, which evidently had destroyed his extensive trade with Ireland. (Thomas told Aubrey his losses amounted to “near 1000 pounds.”) When Holbeach was informed of the predicament of the elder Barrow, he responded by removing Isaac from the boarding home where he had been residing and taking him into his own house; later he appointed him “little Tutour” to Thomas Fairfax, who in 1641 succeeded as fourth viscount Fairfax of Emely in Ireland. The appointment, besides demonstrating Holbeach’s confidence in the talents of the young man, must have also carried with it a small, but much needed, remuneration. Then, on 15 December 1643, Isaac was admitted a foundation scholar at Peterhouse, Cambridge. It is possible, as Gascoigne suggests, that the choice of Peterhouse reflected “the strong Royalist and episcopal sympathies of his father.” Perhaps more relevant, however, is the fact that Barrow’s namesake uncle – and future bishop – was a fellow of Peterhouse at the time and probably procured the scholarship for his nephew. Be this as it may, Barrow never enjoyed his scholarship, for the senior Isaac was ejected the following month by the parliamentary visitors – and moved to Oxford, where he joined Thomas Barrow – while the scholarship was given to another. So Barrow remained with Fairfax at Felsted.

The association with Fairfax, however, nearly sealed Isaac’s scholarly career before it began, for the young nobleman fell in love with a local girl – with a dowry of “only” £1,000 – and married her, despite the fierce opposition of his guardian, Lord Saye and Seale. The latter, faced with the fait accompli, mercilessly cut off all his ward’s sources of income. Some time in 1644 Fairfax left for London, taking Barrow with him, but as his wife’s portion could not last long, Barrow quickly found himself destitute of both patron and income. Again Holbeach came to the rescue. Having searched out his former student in London, the schoolmaster sought to lure him back to Felsted – even promising to make Barrow his heir. Having, however, declined the kind offer and instead went off to visit a former school fellow, a member of the Harley family in Norfolk, who invited Barrow to accompany him to Trinity College, Cambridge, where he promised to support him. If Aubrey’s information is correct, the person must have been Thomas Harley, who was admitted pensioner on 10 March 1645/6, two weeks after Barrow’s own admittance (on 25 February) as subsizar under the tutorship of James Duport.

Trinity College, Cambridge

In 1646, when Barrow entered Trinity, the college had just celebrated its first centenary. Yet the event passed almost unnoticed owing to
the Civil War and the Puritan rise to power. The immediate, and devastating, result for the college was the ejection of most of the fellows (forty-nine of sixty) during 1644–5 by the parliamentary visitors – including the master Thomas Comber, the poet Abraham Cowley, and the scholars Herbert Thornhike and Robert Goreman. The purge was followed by the intrusion of many “loyal” scholars and fellows of other colleges, chief among them the new master, Thomas Hill, who was destined to play a significant role in Barrow’s career at Cambridge.¹⁴

On the face of it, Hill was the most unlikely candidate to serve as Barrow’s patron. Reputed to be the most dogmatic and rigid Presbyterian of the eight intruded masters who were members of the Westminster Assembly of Divines, Hill quickly acquired a reputation as a seeker of sweeping religious reforms at Cambridge. As early as 1643 he urged Parliament to effect a “purging and pruning” of all Laudian innovations, a task he took quite seriously during the first years of his mastership. Certainly, in matters of religion he was uncompromising. Oliver Heywood, an exact contemporary of Barrow, recorded that Hill “would sometimes lay his hand upon his breast, and say with emphasis, ‘Every Christian has something here that will frame an argument against Arminianism.’” In his funeral oration of Hill, Anthony Tuckney recorded that Hill “had made a fair progress in a learned refutation of the great daring champion of the Arminian errors [John Goodwin], whom the abusive wits of the university, with an impudent boldness, would say none there durst adventure upon.” At Trinity, not only was Hill zealous for religious reforms, but he also severely punished a scholar in 1646 who, to the master’s chagrin, maintained Parliament to be more rebellious than the Irish.¹⁵

From about 1647, however, Hill’s reforming zeal appears to have slackened. Though his distaste for Arminianism remained strong, he nonetheless displayed more tolerance toward certain people thus affected. Such conspicuous forbearance may have been a direct result of Hill’s realization that the religious reformation he had so vigorously sought had been achieved, thus making his continued vigilance no longer necessary. More likely, however, it had its roots in Hill’s reaction to the swift rise to power of the Independents, who not only were encroaching rapidly upon the political power of the Presbyterians in church and state, but whose attack on the structure and curriculum of Oxford and Cambridge dangerously imperiled both universities. Thus, Hill, who respected learning (even though he himself was not an exceptional scholar), found himself, no doubt with some surprise, in the position of a staunch defender of the universities. Indeed, fear of the religious and political extremism that many Presbyterians associated with the Independents resulted in a silent coalition of interest between Presbyterians and Royalists – much more pronounced at the universities than in the country at large – which, in turn, resulted in a unified front to defend the universities against any attempts at further
reformation or ejection of a large number of fellows, who would then be replaced by supporters of the Independents. Such an alliance, forged in the face of a common enemy, may explain the religious and political pluralism that existed in Cambridge during the 1650s and that pervaded life at Trinity College, as we shall see shortly.

Be this as it may, by the late 1640s Hill had sufficiently mellowed to tolerate even Arminians if exceptionally learned. An example of this new attitude may be found in a sermon he delivered in 1648, in which he unequivocally praised the character and learning of the very Royalist headmaster of Westminster School, Richard Busby, whom he designated as “very able and industrious” and who made his school great, even though Hill desired that the school’s “Moralls, and Spiritualls” be “answerable to the Intellectualls.” That he also held such a view as regards Trinity College may be seen from a sermon delivered later that year: “I earnestly desire wee may have a learned, as well as a religious Reformation.”

When translated into the management of the college, such respect for learning caused Hill to come close to the practice of his friend and intruded master of St. John’s College, Anthony Tuckney, who, when once criticized for not taking sufficient regard of the “godly” in elections for fellowships, replied: “No one should have a greater regard to the truly godly than himself, but he was determined to choose none but scholars,” adding that “they may deceive me in their godliness, they cannot in their scholarship.” In fact, by 1649 Hill was even taken to task for allowing two fellows to retain their fellowships despite their failure to sign the Engagement. And as we shall later see, Barrow was perhaps the chief beneficiary of Hill’s protection at Trinity.

Indeed, it was precisely during 1648–9, when the Independents were gathering forces and the university was under attack, that Hill did his best to support teaching and research at Cambridge. Thus, he convinced Sir John Wollaston, lord mayor of London, to consider endowing a mathematical professorship at Cambridge, the first stage of which was Wollaston’s gift of a yearly stipend of £20 for a reader, a sum he promised to augment to £60 and make into an endowed lectureship if the university approved. In addition, Hill was instrumental in conspiring with John Selden to secure for Cambridge the magnificent Lambeth Palace Library, a gift that soothed some of the envy Cambridge men had felt for half a century for Oxford and its Bodleian Library.

Although the university that Barrow entered may have been reminiscent of the medieval university, in some aspects it had become a new institution. The most important of these involved structural transformations that had occurred during the preceding century, specifically the shift in university government from a collective body of regent and nonregent masters to a collective body of heads of house. This shift was accompanied
by the momentous rise of the college as a major center of undergraduate teaching, which, while not making university lectures obsolete (as is often assumed by historians), nonetheless had far-reaching consequences for the shape and nature of university education. Most important was the gradual disappearance of the medieval division of the disciplines between the B.A. and M.A. curriculum. By the turn of the seventeenth century, the entire arts and sciences curriculum had collapsed into the four years of undergraduate study, thereby transforming the M.A. sequel into a course of independent study aimed at expanding and elaborating the foundations of knowledge previously acquired.

This new trend is already evinced in the 1570 Elizabethan statutes. Having stipulated that bachelors of art should attend the lectures in philosophy, astronomy, optics (perspective), and Greek, the statutes continued, “and that, which had been before begun, they shall complete by their own industry.” Seven years later, William Harrison was able to describe the actual practice of the new incoming system. The undergraduates, he wrote, receive their bachelorship of arts after they have grounded themselves in both trivium and quadrivium, and “from thence... giving their minds to more perfect knowledge in some or all the other liberal sciences and the tongues, they rise at the last to be called masters of art.” By 1608 the official statutes were duly amended to indicate the completion of the process of incorporating the seven liberal arts and the three philosophies into the undergraduate curriculum; the vice-chancellor and heads of house provided an interpretation of the statutes that dropped residency requirements on the grounds that “a man once grounded so far in learning as to deserve a Bachelorship in Arts is sufficiently furnished to proceed in study himself.” This did not mean, however, that most students now departed from the university after obtaining the B.A. degree, only that the university authorities had acquiesced to the new reality without having resorted to the sensitive task of revising the existing statutes.

The reasons for the restructuring of the curriculum were twofold. First, it accommodated the new type of students who were entering the university in growing numbers: Desirous of a well-rounded education yet not interested in acquiring a degree, they never intended to remain for the required four years stipulated for the bachelorship, let alone the additional three years stipulated for the M.A. Thus, the increasing transfer of much of the education to the colleges facilitated the regulation of the undergraduate course on a more individual basis; the respective tutors could and would determine the course of study, its breadth and depth, in accordance with the background, requirements, and desired length of residence of their students. Second, the printing revolution had made obsolete the medieval system of instruction whereby the master dictated from a text he alone possessed. The fact that now all students owned the necessary textbooks forced teachers to devise a new system of instruction. As
More information

John North put it, “Since books are so frequent as now they are, public lectures are not so necessary, or (perhaps) useful, as in elder times when first instituted, because the intent of them was to supply the want of books, and now books are plenty, lectures might better be spared, and the promiscuous use of books come in the place of them.”

Nevertheless, there was nothing in these major changes to alter a cardinal facet of the inherited medieval world view, namely, the ideal that a unified body of knowledge be shared by all recipients of higher education. Contrary to the prevailing assumption among contemporary scholars, the influx of “gentlemen” into Oxford and Cambridge did not result in the creation of two parallel educational systems: one for “clerics,” who intended to graduate and proceed into the church and were therefore instilled with traditional “scholastic” education, that is, logic, antiquated natural philosophy, and metaphysics; the other for members of the upper class, who sought no degrees but were destined for the Inns of Court and the management of estates and were therefore treated to the more liberal and “pleasing” subjects, such as cosmography, history, astronomy, and modern languages. In reality, the system remained largely homogeneous in terms of offerings to all students. As we shall see shortly, the prevailing ideal of a shared culture and a unified body of knowledge caused an almost identical course of study to be offered to both groups, the significant difference being that members of the upper class obtained a more “condensed” – that is, shorter and, at times, more superficial – version and were more personally supervised by the tutor. It must be stressed, however, that neither did they dispense with the “scholastic” requirements of logic, ethics, and metaphysics nor were the “clerical” students deprived of “modern” subjects.

The rise of the colleges as centers of undergraduate teaching during the sixteenth century introduced two major features into English higher education: the crucial role of the tutor in guiding a student’s course of study and the institution of lectureships within the colleges in order to supplement tutorial instruction. Yet the tutorial system itself was rapidly evolving and by the mid-seventeenth century had undergone an important modification. If during the Elizabethan period the students had been more or less evenly distributed among the fellows of a college, by 1650 most undergraduates were assigned to a handful of the more junior fellows. This change was prompted by the recognition that the multiple employments of the seventeenth-century college necessitated a more sensible division of labor among college fellows. A college such as Trinity, for example, employed nearly a third of its fellows as either lecturers or examiners; the senior fellows, for their part, were burdened with administration or ministerial duties. Consequently, there emerged a system in which for some time the junior fellows were in charge of teaching and the tutorials of the majority of students; thereafter, they would be “promoted” to
more weighty offices and allowed more time to pursue research. As Thomas Hill, the master of Trinity during Barrow’s student days stated, “The Seniors need not trouble themselves with taking Pupils, their Colledge businesses being so many, and their pittance of time (all things considered) but small for the improvement of themselves.”

This system invited abuse, and the annals of Cambridge and Oxford indeed indicate widespread abuse during the eighteenth century. Yet, at least during the seventeenth century, the new structure was quite successful. Following his arrival at university, the incoming student was given a sustained period of attention. His tutor would acquaint him with the course and order of study, provide him with introductory manuals delineating the basics of the various disciplines, and then set down the course of study, which the student was expected to pursue independently, meeting daily with the tutor to report his progress or enlist help. Joseph Mede’s biographer provides a good illustration of the system:

After he had by daily Lectures well grounded his Pupils in Humanity, Logick and Philosophy, and by frequent converse understood to what particular Studies their Parts might be most profitably applied, he gave them his Advice accordingly.

And when they were able to go alone, he chose rather to set every one his daily Task, then constantly to confine himself and them to precise hours for Lectures.

This type of instruction may help explain the sudden proliferation of manuals and “advices to students” by the middle of the seventeenth century. These guides, prepared by tutors for the benefit of their charges and designed to provide rules of conduct as well as general instruction on books and methods of study, were intended to substitute for the lack of continuous lecturing and sustained personal tutorials. It was thus possible for a tutor to take charge of a large group of pupils. Not solely responsible for their scholars’ education, the tutor’s task was rather to ensure that they attended the daily college – and, when appropriate, university – lectures and to supervise their readings. What was equally important and time-consuming, he was to guide their religious instruction, supervise their behavior, and be responsible for their finances.

The students, for their part, enjoyed a certain amount of intellectual freedom that prepared them for the independent course of study they were expected to follow after graduation. No less important, the system allowed students to benefit from the instruction of fellows other than their official tutors. This was especially significant in specialized topics such as Semitic languages and the sciences, for now the tutors could “farm out” students to other fellows (at times for a fee) who were better qualified to teach them. As we shall see, such was the practice of James Duport, who directed his students to Isaac Barrow for part or all of their instruction in
mathematics. Another example is Henry More, who, though reluctant to take on the tedious responsibilities of tutor, was nonetheless prepared to provide scientific instruction to certain students.\textsuperscript{26}

If Barrow was fortunate to find a protector in Thomas Hill as master of the college, he was blessed in having James Dupont as his tutor. Dupont came to Trinity from Westminster in 1622 and was elected fellow five years later, graduating M.A. in 1630. From his student days he was renowned for his linguistic skills – particularly Greek – as well as for his wit. The latter talent earned him the appointment of praevericato (or commencement jester) for the year 1631, when he expounded with elegance and humor on the topic “Aurum potest produce per artem Chymicam.” In performing the task, Dupont appears to have achieved the rare feat of amusing his auditors without provoking the wrath of the university authorities, as was often the case. Following the untimely death of Ralph Winterton in 1639, Dupont was elected his successor as Regius Professor of Greek. He proved to be both a popular and a skillful lecturer. His lectures on the characters of Theophrastus and the orations of Demosthenes still survive, the latter seeing publication during the nineteenth century. His rendition of the Book of Job into Greek meter became an immediate success, and his other attempts at producing religious literature in Greek translation – particularly the Book of Common Prayer and the Psalms – were also popular. Dupont’s main scholarly publication, however, was the erudite *Homeri gnominologia*, which, though expounding the popular seventeenth-century topic of “proving” the affinity of Greek to Hebrew, demonstrated more than a common knowledge of classical and biblical studies.\textsuperscript{27}

Upon his election as Regius Professor, Dupont also obtained a mandate from Charles I that allowed him to continue to serve as college tutor and retain his seniority and the college dividends, notwithstanding the contrary stipulation of the statutes governing the professorship.\textsuperscript{28} Dupont, however, never exercised this dispensation before 1645, at which time he began assuming the tutorial responsibilities for a significant share of the yearly intake of undergraduates at Trinity College. In fact, during the fifteen years of Puritan hegemony (1645–59), Dupont served as tutor to some 180 students, or more than 20 percent of all undergraduates admitted to Trinity during that period! Undoubtedly, Dupont assumed such a tiresome and taxing new role as a consequence of the upheaval in both state and university that had resulted in the mass expulsion of Royalist and Anglican fellows, leaving Dupont virtually the only tutor at Trinity who publicly espoused Royalist and Anglican sympathies. Yet Dupont’s continuance to hold his professorship – as well as the adjoining Trinity fellowship, albeit on new terms – was tolerated in part because of his popularity and in part because, as Monk put it, “there probably would