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1

The Hopeful Youth, 1642–1664

Early childhood

The Newton family belonged to the yeoman class descended from the most modest of the free landholders of manorial England. Socially beneath the esquires and knights, some members of this class had prospered greatly after the fourteenth-century decline of feudalism. Later the dissolution of the monasteries, sheep-farming and inflation had given some yeoman families, like the Newtons, means to enter the gentry class. As small landowners they lived in solid houses of brick or stone, sometimes adjacent to the barns and farmyard, like Newton's birthplace at Woolsthorpe in Lincolnshire. Yeomen, who could not prosper by idleness, constituted a great reservoir of ambition and talent, supplying Church, universities and the law, as well as commerce and industry. They wrote plays for the stage and music for the nobility; they staffed the empire. The father whom Isaac Newton never knew, also Isaac, could not sign his name but his mother and half-sisters were literate after the phonetic style also practised by the greatest ladies. When the posthumous child was three years old his mother, Hannah, remarried Barnabas Smith, rector of nearby North Witham. Smith owned a small library of theological books, works of the Fathers and so on, which passed to his stepson. Thus Isaac was born into the lower limit of landed

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property and learning alike. When he was old and famous he took pains to satisfy the College of Heralds of his common descent with an established armigerous gentleman, Sir John Newton, who was glad to bring so famous a man among his own kin. Sir Isaac Newton for his part responded to many begging letters from *his* poor relations.

The connected families – Newtons, Babingtons, Blyths, Chapmans, Smiths and Ayscoughs (Hannah's family) – were spread all over the East Midlands.[1] Apart from any undocumented direction, spiritual or scholastic, given to young Isaac by his stepfather, we know of two close connections, his uncle William Ayscough and Humphrey Babington, who were members of Trinity College, Cambridge, the latter being a Fellow of the College when Newton went into residence there. Each has been credited with the chief responsibility for sending Newton to the University, and it was certainly at Babington's rectory at Boothby Pagnell (another village close by) that Isaac Newton, in the autumn of 1665, evaluated a hyperbolic area to "two and fifty figures": the computation survives to this day.[2]

The impulse to thrive, strong in the yeoman class and evident among Newton's forebears, was certainly possessed by Isaac himself. After an unpromising start in life – for he was to go up to Cambridge as a sizar or student servitor who might act as his tutor's copyist – Isaac far surpassed socially all his family except Sir John. Early life revealed in him practical talents in mechanics, skill with his hands that matured into experimentation; later life brought out his capacity for administration and public business. If Newton had not achieved great intellectual distinction, he would have made his mark in some other way. And he had it in him to excel as scholar or theologian if he had not first taken to mathematics and natural philosophy.

Isaac's family had been settled in Woolsthorpe-by-Colsterworth in Lincolnshire, hardly more than a hamlet, since at least the mid-sixteenth century. Whether, as Newton claimed, they were entitled to the status of lord of the manor of Woolsthorpe seems rather doubtful, since it is not clear that a legal manor distinct from Colsterworth existed. One of Isaac's great-uncles did very well; that line produced his contemporary, the Sir John Newton already mentioned, and married into the great family of Coke of Norfolk, later Earls of Leicester. On a different level, when all the lands at Woolsthorpe came into his possession they seem to have been worth in rents and dues at least £200 per annum to Isaac Newton: no despicable sum in those days, approximating to the salary of Newton's professorship at Cambridge. Newton was therefore never poor and, after his mother's death in 1679, could have lived in Cambridge, if he had wished, in a

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state of some affluence. He was well able to keep up the dignity of his fellowship and University offices. By the time he was writing the *Principia* ('The Mathematical Principles of Natural Philosophy') in the 1680s Newton was a wealthy if eccentric senior professor, a man of some authority. In the last phase of his life he was to become a very rich man indeed.

Isaac Newton's father died in October 1642, six months after wedding Hannah Ayscough and almost three months before his son's birth on Christmas Day. His will defined his flourishing estate: besides the 'manor' and its houses he owned property worth £460, including a large flock of sheep, cattle, and ample stores of hay and grain. With his father dead before his birth and his mother remarried, the boy was brought up at Woolsthorpe by his grandmother, Margery Ayscough. His grandfather, James, left nothing to young Isaac Newton in his will, made when Isaac was ten years old, nor did Isaac ever refer to him (though he did recall his grandmother as his foster-mother and otherwise). Hannah's inheritance under James Ayscough's will came to Newton after his mother's death. He also profited (after coming of age on 25 December 1663) from the settlements made at the time of his mother's marriage to the deceased Barnabas Smith.

The mature and opulent Newton took pride in his landed status and defended his (dubious) rights as lord of the manor to control the pasturage of animals on the common lands of Woolsthorpe and the felling of timber. Until after his mother's death he returned there at regular intervals and it was in Lincolnshire that Newton spent that marvellous eighteen months when he was "in the prime of" his "age for invention in mathematics and natural philosophy". His county retained its hold on his affections to the end of his days and he relished the opportunity to chat with younger men from Grantham and thereabouts, like the future antiquary William Stukeley. Though never setting foot in his village during the latter half of his life, Newton kept in touch with its affairs through his reeve or agents, insisted upon his rents and performed his charitable duties in repair of the church and so forth. Late in life Newton was generous to his relatives. One wonders whether Humphrey Newton, who came up to Trinity College from Grantham in 1685 and served for five years as Isaac's copyist – the printer's manuscript of the *Principia* is in his hand – was not one of these, though all writers except Stukeley deny the connection; the rather pompous name of Humphrey was also borne by Dr Babington. After Newton's death Humphrey, then a physician in the town of his birth, was solicited for his recollections of the great

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man with whom he had lived intimately. Humphrey replied with invaluable accounts of Newton's habits and behaviour without elucidating the nature of his genius, except to say that he was absent-minded and eccentric.

Isaac Newton was particularly fond of his half-sister Hannah, named Barton by her marriage. At the end of his life he provided for the children of her son Robert who (as an army colonel) had been drowned in the course of a disastrous expedition to French Canada in 1711, buying them a country estate. Hannah's daughter Catherine was the dearest of Newton's young relatives. Since she lived with him in London from 1696 until her late marriage in 1717 she will reappear in the biography; it was she with her husband, John Conduitt, and their descendants who transmitted Newton's unpublished intellectual legacy to posterity.

The elder Hannah's first baby was a tiny infant, presumably premature, which no one expected to live. As Newton himself quaintly put it, he could be fitted into a quart pot – a strange experiment! Whether he was put out to nurse, what was his life in petticoats, we do not know. As might be expected, his mother's departure to North Witham when Isaac was three afflicted the small child grievously. We do not know that James Ayscough disliked children, or that he gave young Isaac his first lessons, or that he whipped him for his mistakes; but the treatment of children in the seventeenth century is not generally regarded as having been soft and kindly. 'Spare the rod and spoil the child' was an injunction ubiquitously accepted as true, and no doubt young Isaac received his share of this blessing. A fictional picture of Newton's childhood may perhaps have been written by Samuel Butler in imagining an upbringing early in the last century:

> Before Ernest could well crawl he was taught to kneel; before he could well speak he was taught to lisp the Lord's prayer, and the general confession. How was it possible that these things could be taught too early? If his attention flagged or his memory failed him, here was an ill weed which would grow apace, unless it were plucked out immediately, and the only way to pluck it out was to whip him, or shut him up in a cupboard, or dock him of some of the small pleasures of childhood. Before he was three years old he could read and, after a fashion, write. Before he was four he was learning Latin, and could do rule of three sums.[3]

It seems strange that (unlike Butler, and Somerset Maugham in his finest novel) Newton's biographers have generally spent little pity on

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his (probably) loveless and lonely childhood, while expatiating on the twists that this may have introduced into his personality. Virtually orphaned for eight years, he lacked siblings to provide comfort or divert wrath. It is unsurprising that Frank E. Manuel has taken the Freudian theory of the Oedipus complex to explain the whole future development of Newton's character, distorted by the loss of his father and the absence of his mother during infancy.

In the summer of 1662, perhaps when home for the long vacation from Cambridge, Newton experienced a fit of religious fervour (of which Ernest's father in Butler's novel would surely have approved) inducing him to make a record of his private sins in Shelton's shorthand, which he had just mastered. Presumably the twenty-year-old used this script, as Samual Pepys did, as much for secrecy as for speed. In all his mass of papers, it seems, Newton only once employed shorthand again, about a couple of years later for an entirely unprivate record. Since this bizarre document is unique, we cannot tell whether the undergraduate Newton was usually, or on any other occasion whatever, so punctilious in accounting to God for his peccadilloes, but probably not. Several of the sins indicate normal observance of formal religious obligations: they include breaches of the sabbath, such as "Making a mousetrap on Thy day" or "Idle discourse on Thy day and at other times" and "Twisting a cord on Sunday morning". Others record a more general impiety: "Not loving Thee for Thyself" or "Not desiring Thy ordinances" and "A breaking again of my covenant renewed in the Lord's Supper" and "Missing Chapel [at College]". A few hint at the normal sexual pressures upon adolescent boys and young bachelors: "Having unclean thoughts, words and actions and dreams", "A relapse", again "A relapse" and possibly even more directly, "Using unlawful means to bring us out of distresses". Some may take this to refer to magical practices, but this seems really unlikely. Most interesting in the list of forty-nine sins committed before Whitsuntide 1662 are those that give a glimpse of Newton's family life, indicative of that sort of bad temper that mars us all from time to time: "Falling out with the servants" or "Peevishness with my mother" or "Refusing to go to the close [field] at my mother's command" and "Punching my sister" – younger than he! Other casual acts of violence recorded are ordinary enough with schoolboys, and naughty playfulness appears again in "Squirting water on Thy day" or "Robbing my mother's box of plums and sugar" and "Calling Dorothy Rose a jade". The sporting tastes of older boys seem to be implied in the following: "Denying a crossbow to my mother and grandmother though I knew of it" – surely forbidden

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indulgence in fowling with another boy's sporting weapon? (Would Newton have been reassured by knowing that that great and pious man of science, Robert Boyle, also went fowling with a crossbow?) Many of the sins already quoted plainly belong to a childhood long before the ripe age of twenty, to which may be added "Peevishness at Mr Clarks for a piece of bread and butter" (he had lodged with the Clarks when at school in Grantham) or eating an apple in church, stealing cherry cobs from Edward Storer, swimming in a kimnel [tub] on the Lord's day, so that we may imagine these trivial offences being recollected as the major crimes of past years. At Cambridge, besides missing chapel (where daily attendance was required of undergraduates) and also sermons at Great St. Mary's church, Newton had done such terrible things as using a fellow-student's towel "to spare my own" and "Deceiving my chamber-fellow of the knowledge of him that took him for a sot". Gluttony is also recorded more than once, a sin conspicuously absent from Newton's mature life.[4]

As the notes above indicate, Newton's stepfather had died in 1653 and from that date until his departure for Cambridge in 1661 the boy lived in a family consisting of his grandmother, mother, half-brother and two half-sisters, as well as (one may suppose) three or four servants. The eight years of isolation were over. To those years we may confidently assign the most extraordinary of the sins Newton listed: "Threatening my father and mother Smith to burn them and the house over them" to which may be related "Wishing death and hoping it to some". Newton was not the first child nor the last to nourish furious anger against parents or those *in loco parentis* and the setting of houses afire by quite small children is not unheard of. That Newton remembered for ten years such impotent fury and then recorded it solemnly is a measure of the damage that he had undergone. The other sin may be a personal death-wish, as well as a wish for the deaths of others. Did Isaac hope that Barnabas Smith and James Ayscough might soon die?

Whatever the black misery in his heart, we have nevertheless a little evidence that Isaac Newton lived as little boys do live in the country, playing, fighting, robbing orchards, quarrelling with his sisters, persecuting small birds, eating sweets when he could get them. We need not imagine that he never laughed – though Newton was not given to mirth in later life – nor that he was always peevish. At a time when even quite small boys were expected to take some share in the farm-work, and the Newtons were not so grand that the heir to the estate might count himself exempt from this necessity, Isaac clearly disliked such tasks. He would not take a message to the

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men in the field, and one anecdote tells of his tendency to read a book in the hedge-bottom rather than watch for the straying of the sheep. Another states that he once came back from Grantham with only a halter in his hand, having become quite oblivious of the horse that had slipped it. Yet another sin recorded in 1662 was "Setting my heart on money, learning [and] pleasure more than Thee". Few boys would couple learning with money and pleasure as one of the great besetting temptations of life. Do the compass-scratchings and the sketch of Grantham church adorning the Woolsthorpe walls – if Newton really made them – indicate boredom?[5]

Grantham School

Even in remote Lincolnshire – not of course the fens, but what Newton's young friend Stukeley thought a country 'exceeded by none [in all England], for a fine air and for pleasantness; being most agreeably diversify'd with open heaths, rich meadow and inclosure, woods and parks; the most beautiful cornfields, springs, brooks and rivers'[6] – the eldest son of a family such as the Newtons now were was expected to have more learning than could be acquired in a village dame-school, such as those in which Isaac learned his letters. Five miles away in Grantham town was a Free Grammar School, ancient and esteemed. A pupil earlier in the century had been Henry More (1614–87), now a senior Fellow of Christ's College, Cambridge, and a distinguished academic author. Isaac probably encountered More at Grantham, since upon occasional visits to his home town he stayed with the Clarks, in whose house Isaac lodged; they were certainly acquainted at Cambridge later. Isaac attended the Grantham Free School from the age of eleven or twelve until he was eighteen or nineteen, for he entered Cambridge at a greater age than was then usual, when upper-class boys still arrived with their private tutors at the tender ages of fourteen or fifteen. Contemporary anecdote accounts for this by the story that Newton's mother took him from the school to manage the estate, then was persuaded to allow him to return and prepare for Cambridge. It is sad that only generalities can be offered about his instruction there; Latin certainly (in this language Newton, like all educated men and women, was always fluent on paper, and he may well have conversed in Latin with some visitors from the Continent); the elements of Greek, again used by Newton in his scholarly activities but no one would call him a Greek scholar;

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arithmetic but perhaps no geometry; no modern languages.[7] D. T. Whiteside emphasizes that Isaac was no calculating boy-prodigy;[8] throughout his life he was liable to commit unnoticed arithmetical errors. The biographer, however, cannot exclude the possibility that either Stokes, the 'Master' of the Free School, or Mr Clark his 'usher' (brother of the apothecary with whom Newton lodged and a former pupil of Henry More at Cambridge) privately took the able boy well beyond the usual limits of grammar-school mathematics. Both were able men. Again, anecdote has it that it was Stokes, together with her brother William Ayscough, who persuaded Mrs Hannah Smith 'what a loss it was to the world, as well as a vain attempt, to bury so extraordinary a talent in rustic business' and that he should go to the University.[9] Moreover, Newton, during his brief return to school in 1660, lodged with Stokes, as though for private tuition, and certainly if the anecdote is true *some* work must have been done at the school that convinced his teachers of Newton's great mental powers. Another anecdote tells of his dismissing Euclid's *Elements* with contempt during his early Cambridge days; if he had already mastered some of its propositions while at school this might account for his putting on airs about the book which was new to most of his fellow-undergraduates.

Stukeley's *Memoirs* are also the only source for there having been a touch of romance in Newton's early life. Apothecary Clark had married a widow, Mrs Storer, with two sons and a daughter; Arthur and Edward are positively recorded in Newton's own manuscripts. As for the nameless Miss Storer, who was also a niece by marriage of Dr Humphrey Babington of Trinity College, Cambridge, Newton 'was said' to have 'entertaind a passion for her when they grew up', a story that Mrs Vincent (as she became) in extreme old age was vain enough to confirm to Stukeley, who continues:

> 'Tis certain he always had a great kindness for her. He visited her whenever in the country, in both her husbands days, and gave her, at a time when it was useful to her, a sum of money. She is a woman but of a middle stature, of a brisk eye, and without difficulty we may discern she has been very handsom.[10]

No other woman outside Newton's own family is known to have aroused any sentiment in him, and he is confidently supposed to have remained a chaste bachelor till the end. I agree with Louis Trenchard More that the letter printed by Brewster as a proposal of marriage from Newton to Lady Norris – a widow with whom he was

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indeed acquainted – is very unlikely to be genuine.[11] It is not in his hand or his style and it is hardly likely that he would figure as a bridegroom for the first time in his sixties.

Mrs Vincent describes Isaac as a 'sober, silent, thinking lad' who wasted little time on play with other boys. There may be cause to doubt that this common sombre recollection of a great man is exactly true, though Newton may have grown more studious and reserved as he passed into adolescence. She also recalled Isaac's skill in copying engravings with the pen (I suppose this is what was meant); a sketch of Grantham church survives on the wall at Woolsthorpe and numerous little sketches in Newton's scientific manuscripts witness to some slight skill in pen and pencil drawing. Those who recalled Newton's childhood also dwelt on his mechanical bent; at some period of his life he must have spent many hours fabricating models of wood. Stukeley wrote of older people marvelling at a windmill constructed not far from Grantham, the first in a district hitherto content with its ample streams for the grinding of corn: 'Newton's innate fire was soon excited. He penetrated beyond the superficial view of the thing . . . He obtain'd so exact a notion of the mechanism of it, that he made a true and perfect model of it in wood; and it was said to be as clean a piece of workmanship as the original.'[12] He also made a wooden clock driven by weights in the usual way, and also two water-clocks working on different principles. Like other boys, he made kites and flew them at night to take lighted lanterns aloft, and contrived sundials 'So that Isaacs dyals, when the sun shined, were the common guide of the family and neighbourhood.'[13] Dialling involves some sense of geometry and even astronomy; a method is copied into a notebook dated 1659.[14] The boy exercised his mechanical skill not only at home but in his free hours at school in Grantham.

Indirect confirmation of this artisanal skill is given in Newton's later life by his handiwork in practical optics and chemistry. He knew how to turn wood on a lathe, to melt metals in a furnace, to undertake simple blacksmith's work, to cut screw-threads, to lay bricks, as well as engaging in carpentry. This was more than a century before Louis XVI amused himself with lathe-work and lock-making, and Tolstoy's eccentric Prince Bolkonsky released his psychological tensions by engine-turning. The gentlemen of the Royal Society were of course familiar with firearms and they carefully collected accounts of many trades from agriculture to textiles, but few of them had actually acquired and practised manual dexterity – Robert Hooke was one of the exceptions. Designs for new scientific instruments and apparatus

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were normally turned over to the professional instrument-maker, as James Gregory did with his design for a reflecting telescope, and both Hooke and Christiaan Huygens did with improved mechanisms for clocks and watches. Newton was highly exceptional in his mastery of craft skills for scientific ends.

Akin to young Newton's interest in mechanisms and perhaps not unconnected with his lodging above an apothecary's shop was his concern for pigments and receipts. In a notebook seemingly bought (for 2½d) in 1659 Isaac entered notes about drawing, painting, pigments (including "Colours for naked pictures"!), gilding and all sorts of practical tips and wrinkles – "A bait to catch fish", "A Salve for all sores", "A Water to clear the sight", "To Cut a Glasse". These, like some of the ideas for mechanisms, were copied from one edition or another of John Bate's *The Mysteries of Nature and Art* – the book is not one which Newton is known to have owned – and he may also have drawn on John Wilkins's *Mathematical Magic* (1648).[15] Into the same notebook, probably a Cambridge undergraduate now, Newton entered astronomical tables and an ecclesiastical calendar (beginning in 1662), three pages on the Copernican system, and notes upon plane and spherical trigonometry. This notebook, in the Pierpont Morgan Library in New York, clearly extended from Isaac's late schooldays into his undergraduate period. Into it he also copied lists of words from Francis Gregory's *Nomenclatura brevis anglo-latino*, about 2400 in all, interpolating words of his own into the sequences. So he made *Offender* follow *Orphan*, making his own 'self-accusatory association', as Frank Manuel has it. Manuel also finds testimony to Newton's puritanical, grim, guilty frame of mind in the English sentences he made up for rendering into Latin: for example, "What else is to dance but to play the foole?"[16]

From this slight evidence, whether or not it casts light upon Newton's psychological constitution, it is hard now to determine if he was well prepared for the University in comparison with other boys, or where the tinge of genius may have been disclosed. He cannot have had that fierce drilling in the classical tongues and their literature that Dr Busby's Westminster gave, nor had his speech, tastes and graces been refined on the Grand Tour by which the aristocracy already polished its scions. What he had clearly acquired, and would exploit in his mature life, was a tremendous capacity for teaching himself; all the anecdotes insist upon his autodidact knowledge and skills. He had also acquired the habit of steady toil. No man has ever possessed a greater capacity for intense, concen-

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