them to the tails of his kites, which the terrified country-people took for comets. Meanwhile, in the yard of the house where he lived, Newton was frequently observed to watch the motion of the sun; he drove wooden pegs into the walls and roofs of the buildings, as gnomons, to mark by their shadows the hours and half-hours of the day. It does not appear that he knew how to adjust these lines to the latitude of Grantham; but he is said to have succeeded, after some years' observation, in making them so exact, that anybody could tell what o'clock it was by *Isaac's Dial*, as it was called; and, probably, about this time, he carved two dials on the walls of his own house at Woolsthorpe, one of which is now in the museum of the Royal Society. Newton also became expert with his pencil: his room was furnished with pictures, drawn, some from prints, and others from life, in frames made by himself: among the portraits were several of the King's heads; Dr. Donne; Mr. Stokes, his teacher at Grantham; and King Charles I; also, drawings of "birds, beasts, men, ships, and mathematical diagrams, executed with charcoal on the wall, which remained till the house was pulled down in 1711." Although Newton stated that he "excelled particularly in making verses," no authentic specimen of his poetry has been preserved; and in later years, he often expressed a dislike for poetry. During the seven years which he spent at Grantham, to the society of his schoolfellows he preferred that of the young ladies who lived in the same house, and he often made little tables, cupboards, &c., for them to set their dolls and their trinkets upon. One of these ladies, when she had reached the age of 82, confessed that Newton had been in love with her, but that smallness of income prevented their marriage.

When Newton had reached his fifteenth year, he was recalled from the school at Grantham to take charge of his mother's farm: he was thus frequently sent to Grantham market, to dispose of grain and other agricultural produce, which, however, he generally left to an old farm servant who accompanied him, and Newton made his way to the garret of the house where he had lived to amuse himself with a parcel of old books left there; and afterwards he would entrench himself on the wayside between Woolsthorpe and Grantham, devouring some favourite author till his companion's return from market. And when his mother sent him into the fields to watch the sheep and cattle, he would perch himself under a tree with a book in his hand, or shaping models with his knife, or watching the movements of an undershot water-wheel. One of the earliest scientific experiments which Newton made was in 1658, on the day of the great storm, when Cromwell died, and when he himself had just entered his 16th year.

Newton's mother was now convinced that her son was not destined to be a farmer; and this, with his uncle finding him under a hedge, occupied in the solution of a mathematical problem, led to his being again sent to Grantham School, and then to Trinity College, Cambridge, which thence became the real birthplace of Newton's genius. We have not space to detail how he mastered Sanderson's Logic, and Kepler's Optics, before he attended his tutor's lectures upon those works; how he bought a book of Judicial Astrology at Stourbridge Fair, and to understand its trigonometry, purchased an English Euclid, which he soon threw aside for Descartes' Geometry; his long continued observations upon a comet in 1664; his first discovery of Fluxions in 1665; his first study of Gravity, suggested to him by the fall of an apple from a tree while sitting in his garden at Woodsthorpe; his purchase of a glass prism at Stourbridge Fair; his first application to optical discoveries; his construction of telescopes, &c. But we cannot leave him without remarking that late in life, ascribing whatever he had accomplished to the effect of patient and continuous thought rather than to any peculiar genius with which nature had endowed him, he looked upon himself and his labours in a very different light from that in which both he and they were regarded by mankind. "I know not," he remarked, a short time before his death, "what I may appear to the world; but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me." How touching is this sense of humility, and contrast of the littleness of human knowledge with the extent of human ignorance!

CXIII.

WILLIAM PENN AT OXFORD.

William Penn, whose name has become "throughout all civilized countries a synonyme for polity and philanthropy," was born October 14, 1644. He grew up into a graceful and promising child at Wanstead, in Essex, and was sent to learn the first rudiments of scholarship at a grammar-school at Chigwell, then recently founded by the Archbishop of York. When he was eleven years old, his father, Admiral Penn, was arrested by order of Cromwell for his alleged share in the failure of an attack on Hispaniola; and young Penn "a quick-witted and affectionate child, was overwhelmed with melancholy" at his father's arrest. While in this state of mind, he was one day surprised in his room, where he was alone, with an inward and sudden sense of happiness, akin to a strong religious emotion; the chamber at the same time appearing as if filled with a soft and holy light." This incident has been regarded by some as a miracle,—by others as a delusion; but Mr. Hepworth Dixon, the earnest biographer of Penn, considers the lively and sensitive child being in a morbid condition of mind; and his father being in a few days set at liberty, "it is probable that the glory which filled the room and the feeling which suffused his frame were simply the effects of a sensitive temperament over-excited by the glad tidings of this release." His father then retired with his family into Ireland, where William "rapidly improved, under a private tutor from England, in useful and elegant scholarship. He exhibited already a rare aptitude for business. In person he was tall and slender, but his limbs were well knit, and he had a passionate fondness for field sports, boating, and other manly exercises. In the elementary parts of education he had already made such progress that the Admiral thought him ready to begin his more serious studies at the University; and, after due consideration, it was resolved that he should go to Oxford." After a year's delay, to Oxford he went, where he matriculated as a gentleman commoner at Christchurch, of which Dr. John Owen was Dean: South was Orator to the University; and here were Wilmot, Earl of Rochester, and "the noblest and most notable of all ornaments of Oxford at that day,"—John Locke. Penn proved at college a hard student, a skilful boater, and adventurous sportsman; his reading was solid and extensive, and his memory excellent. His great pleasure and recreation while at Christchurch was in reading the doctrinal discussions to which the Puritan idea had given rise; and the preaching of the new doctrines taught by George Fox, and the threatened restoration of popish usages, led Penn and others into forcible opposition to the orders of the Court, for which they were expelled the University. For a boy, he left Oxford with a profound acquaintance with history and theology. Of languages he had more than an ordinary share. Then, and afterwards, while at Saumur, (in France,) he read the chief writers of Greece and Italy in their native idioms, and acquired a thorough knowledge of French, German, Dutch, and Italian. Later in life he added to his stock two or three dialects of the Red Men. Upon his return to England, Penn's father entered him as a student at Lincoln's Inn, that he might acquire some knowledge of his country's laws. He did not remain long in London, but returned to Ireland; and at Cork, hearing an old Oxford acquaintance preach the doctrines of George Fox, from that night Penn became a Quaker in his heart.

(To be continued.)

Suggestive Hints towards Improved Secular Instruction.

BY THE REV. RICHARD DAWES, A. M.

XI.

NATURAL PHILOSOPHY.

(Continued from our last.)

Another of Leslie's experiments. Take a cubical vessel, made of tin, one surface blackened, a second scratched, the third more roughened, and the last smooth; fill it with boiling water, and place the differential thermometer near it, and turning each side in succession towards it, it will be found that the quantity of heat radiated, or thrown off from the different surfaces, will be in the order mentioned above. Professor Leslie covered the surface of the vessel with thin plates or layers of different substances of different colours, and noted the number of degrees which the thermometer rose, and thus ascertained the radiating power of each particular covering.

Lamp-black.....	100°	Clean lead	19°
Writing-paper	98	Iron, polished.....	15
Tarnished lead.....	45	Tin-plate.....	12

He then, instead of blackening or otherwise meddling with the faces of the tin vessel, made it perfectly smooth, and covered the bulb of the thermometer with the different substances, and found