

Newton

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From the very first page Gleick sets his agenda. He is not out to write a biography of a scientist, he is out to write a biography of the greatest scientist ever. As Gleick writes: No one before Newton, and no one after, can rival him, as he effected the greatest shift of paradigm that the world has ever known. On one hand it is gratifying to read such appreciation, especially as Newton, and in particular what is referred to as Newtonian, has come under uneducated attack, seen to represent whatever is linear and mechanical and predictable. As a matter of fact Gleick himself, as the author of 'Chaos' some fifteen years back, did much to promote that view himself. So why this renewed praise of Newton? Has he seen the light, reconsidered his position, or is he just mostly interested in selling his book?

Why did Newton command such respect, not to say adulation. He became an icon of the enlightenment, and the great success of celestial mechanics became the ideal towards which all systematic inquiry into the matters of men as well as nature strove. The tale is familiar to most readers, and in addition to what has been classically known for centuries, there are nowadays also the huge amount of 'Nachlass', mostly dealing with alchemy and delvings into the Holy Scriptures. This is material that was salvaged only some fifty years ago, and which led to a major re-evaluation of Newton, who appeared as a far more complex man than the marble bust raised to his memory, would have suggested. Keynes, the man responsible for intercepting a substantial fraction of the material, before it was dispersed by greedy descendants, talked about Newton as far from being the first Modern Man, the portal figure of the Enlightenment, instead was the last of the Mystics, firmly grounded in the preceding Age of Superstition.

I recall travelling to Newtons Birthplace in Lincolnshire with my parents in 1966. It was open to the public, and an old lady showed us around the house. Apart from some glass-protected scratching on the walls, supposedly by the childish hand of Newton, there were nothing in the house, as I recall, to point to the former presence of the great man. But this was not just his birthplace and home of his early years, but it was also here, exiled from Cambridge during the plague, that he made his fundamental discoveries. Back in the 60's there were not many tourists, and I hate to think of what it most likely has degenerated to today, with gift-shops and videos and stiff entrance fees, thus one could still get the impression of privately visiting the man, or at least the site, and I took a picture of an apple tree, which, I must admit in retrospect, stands very little chance of having been already present at the time of Newton, although it had grown to be quite big by then.

Newton was destined to be a farmer, this may in retrospect seem a lowly position, but the manor in which he was born was quite big, and an uncle of his had attended Cambridge. And from what one gathers, his early schooling was considered as a matter of course. Newton was a lonely child, as he would grow up to be a lonely man. But that loneliness had its ample compensations in the form of a passionate curiosity about all

things natural. A curiosity that made him forget the swines he was tending, allowing them to escape into other pastures, to the consternation of the neighbours. One tends to forget about this initial consuming passion, as one gets acquainted with a later Newton, bitter and apparently indifferent about his great discoveries of his youth. That Newton is instead the tragic image of a man, admittedly of a superior intelligence able to probe deeper than his fellow men, yet strangely detached from his own accomplishments. He was also quite mechanically gifted, although all his subsidiary gifts, impressive as they may have been in absolute terms, were naturally eclipsed by the grandeur of his central achievements. But nevertheless the enduring image of his youth is one of relentless curiosity, and the hard work that comes with it. Newtons answer to the question of how he had arrived at his discoveries has often been quoted - 'By always thinking of them'.

So wherein lies his greatness? First he was a mathematician, having learned and assimilated very quickly the level of mathematics that existed in his days. He also pushed significantly further, considering infinite series, incidentally also amusing himself by an extensive classification of cubic curves showing that not everything he touched in science turned into gold, and most of all devising the tools of a calculus of differentiation and summation, centered on the elusive and self-contradictory notion of an infinitesimal. With him, there came a quantification of the phenomena of the natural world, a quantification that turned out to be eminently suitable for the celestial world. The great leap of Newton was to assume that what held on the earth also held in the sky, and the way of making sense of that continuity of effects was the mathematical approach.

But Newton did not work in a vacuum. He was not an unacknowledged genius struggling to be recognised. From the very start his remarkable qualities were appreciated, and it is rumoured that his teacher of mathematics at Cambridge resigned his position for the benefit of his superiorly gifted student. Although the well-known saying of Newton as having stood on the shoulders of giants cannot be confirmed (and according to Gleick it was a common cliché at the time, and thus having no special connection to Newton), he had predecessors, and the empirical approach to the mysteries of the natural world had already gotten a strong foothold as a reaction against the speculations of the ancients. The Royal Society had recently been formed, small and insignificant at the time, but looming large and pivotal in historical retrospective, and which would provide the appreciative audience, without which there is no such thing as a genius.

There are many contradictions in Newton. The most striking and shocking being that he could devote himself with the same passionate commitment to his alchemical investigations, that in retrospect led nowhere, not to mention his broodings over the hidden prophecies in the Bible; that he had brought to his celestial triumphs and patient experimentation as to the nature of light. But to all his activities there was the definite stamp of Newton, and one should be well advised to see them of being of one piece, at least from his point of view, and not necessarily as strange and perverted aberrations. On a less striking plane, it is amusing to note the contrast between his own ostensible detachment to his early discoveries and the jealousy with which he guarded his priority of the same. Such pettiness seems inappropriate of a great genius, and unworthy of an exalted icon. Yet reading about it anew, I am struck with a certain sympathy for his reactions. It must be galling indeed, to be lectured by others on matters, one has probed much deeper oneself. So when Hooke

was casting about a speculative theory of inverse square attraction, Newton hit the roof, because after all he had thought about such matters a long time ago, and deeply to boot, and for him this was not just idle chatter, but a hypothesis tested in many situations, and assuming the role of a unifying principle of his whole edifice. It is natural that you should consider such insights your personal property, because after all the driving force behind curiosity is to not only to view the world but to apprehend it and digest it mentally. Thus curiosity is in fact the most intimate conceivable of all human activities, having as its ultimate goal the total internalization of the external world. (So this is why after having thoroughly understood and digested something, you start to think of it as being part of you, and thus your own natural creation; a fact that may explain the tendency to usurp priority, which often should be explained as more of a manifestation of naivety than one of malicious design.) Less likely to meet the understanding of posterity, let alone earn its approval, are his activities as a Master of Mint, which he took very seriously to the point of actually having counterfeiters executed as personal enemies.

Newton being born prematurely, a tiny fetus whose survival was far from assured, lived to a great age, respectable also to us moderns. He is reported to have kept all his teeth but one, as well as a full head of white hair, and a keen eyesight in no need of glasses. His end was painful, and to modern medicine trivial, namely a passing of a kidney stone (although old age also brings with it a hoist of infirmities, anyone of which may be elevated to the status of a final *coup de grace*.) As far as having been the greatest scientist ever this is obviously up for a dispute, although if candidates for such an honor would be called for, Newton would be a name quickly coming to most minds. In E.T. Bells 'Men of Mathematics', a book which greatly impressed me when I first read it in my early teens; three towering figures of mathematics are particularly singled out - Archimedes, Newton and Gauss. Of the three as mathematicians, clearly Gauss is the most impressive at least technically, on the other hand Archimedes and Newton worked in a less sophisticated setting, which also have made their contributions more fundamental and hence more influential. (There is always an advantage of being on the scene early if you want to make your mark.) He was made an icon of the Enlightenment, and especially Voltaire was instrumental in doing so, thereby seeing to that his fame transcended the local scene dominated by the Royal Society. And he bequeathed to his succeeding generations a most fruitful research project that kept their best minds busy for over a hundred years. As to the case that Newtonian Physics was overruled by Einsteins theory of relativity is a misinformed hyperbole. The crucial difference between Newton and Einstein was that Newton believed, or at least provisionally presumed, the notion of absolute space and time, notions that Einstein was forced to disregard because of empirical evidence (or rather lack thereof) which was never accessible to Newton. In the fundamentals there is otherwise no difference between the two, Einsteins being more in the nature of a refinement to deal with high velocities. Still the accomplishments of the latter are of such a nature, that he can naturally be put up as a rival, and one may see here another incident of the desire of the public to iconize.

Gleicks book, although sympathetic in its unqualified regard of Newton as a scientist, if not human being, and with the commendable restraint in not succumbing to the temptation of discussing Newton in reductive psychological terms (the Asperger syndrome otherwise would seem to be a natural diagnosis in Newtons case, especially as he is no longer

here to refute it); the book leaves in the end a sense of dissatisfaction. One definitely gets the feeling that the book is nothing but a digestion of secondary sources (although that can easily be shown to be an unfair assessment by pointing to some peripheral details), providing no fresh insights, and skimming over a troubled but deeply fascinating life without really showing what made it tick. It is a book written by the layman for the layman, and although most readers would no doubt welcome the almost total absence of technical discussions, their omission leaves a void that anecdotes, and especially the refutations of the same, cannot compensate.

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