

Out of Focus...

The Apple and The Fall

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THE STRANGE CONNECTION that seems to exist between the fruit and the phenomenon is as old as the beginning of the world itself. After all, it was an apple that caused the Fall of Adam and Eve. Then again, it was the fall of an apple, thousands of years later, that led to the discovery of the law of gravitational attraction by Isaac Newton. Byron wrote about the two events in his *Don Juan* :

When Newton saw an apple fall,
 he found...
 A mode of proving that earth
 turn'd round
 In a most natural whirl, called
 gravitation,
 And thus is the sole mortal
 who could grapple

Since Adam, with a fall or
 with an apple.

Byron's unusual notion — 'a most natural whirl, called gravitation' — indicates that he was decades ahead of Einstein in identifying gravitation with accelerated frames of reference.

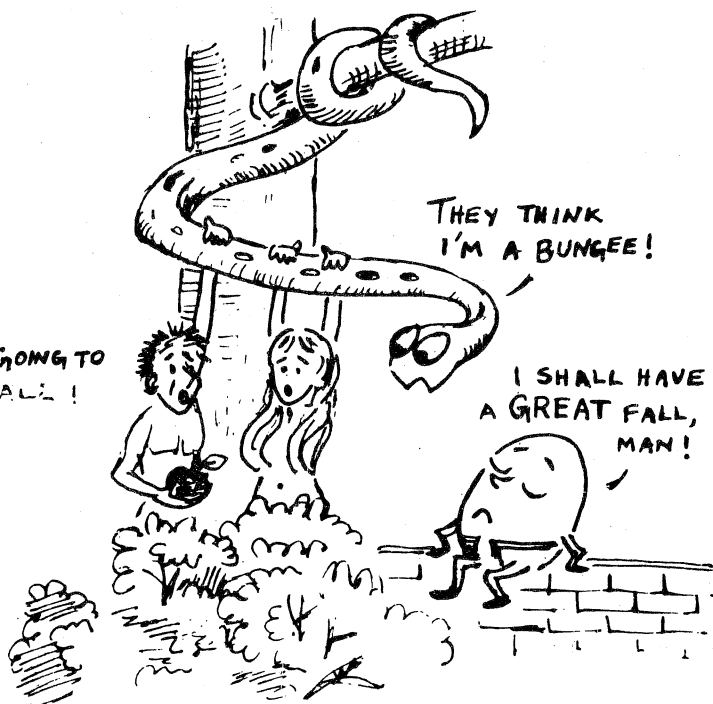
It is a matter of record that Isaac D'Israeli, Benjamin Disraeli's father, whose word we cannot doubt since he had the same first name as Newton, noted that 'the apple struck him (Newton) a smart blow on the head'. Because of this, generations of physics teachers have tried to inspire their pupils by pounding them on their heads substituting fists for apples. Our faith in the historicity of the incident was further fortified by the movie 'The

Story of Mankind' that was made sometime in the nineteen-fifties. In the movie, Harpo, one of the Marx brothers, cast as an unbelievable Newton, sliced the offending apple by running it through the strings of his harp and proceeded to play a sad tune on the instrument. This edifying scene motivated many physicists to pursue research in gravitational physics.

What a shock it is then to find Sir David Brewster, Newton's first biographer, casting doubt on the whole affair of the falling apple! 'I have not been able to find any authority for it', declared Brewster. He did admit, nevertheless, the existence of the apple tree which, he reported, was badly decayed by 1814 and later destroyed by wind. On the other hand, Augustus de Morgan, distinguished for his contributions to logic and mathematics and even more distinguished because of his birth in Madurai, India, had his own thrust to make at Brewster himself. 'One particular tree at Woolsthorpe has been selected as the gallows of the apple-shaped goddess: it died in 1820', he wrote, 'But, Sir D. Brewster brought away a bit of root in 1814, and must have had it on his conscience for 43 years that he may have killed the tree'. Mr. Turner, the manor owner, is said to have preserved part of the apple tree in the form of a chair. The chair, with such an inspiring lineage, must have no doubt imparted, to all those who sat on it, knowledge *a posteriori*.

On the positive side, there is indeed sufficient evidence for the apple story. A detailed account is due to William Stukeley, a medical doctor and friend of Newton. Here is his report of his after-dinner conversation with Newton on April 15, 1726 :

The weather being warm, we went into the garden and drank tea, under shade of some apple-trees, only he and myself. Amidst other discourses, he told me, he was just in the same situation, as when formerly, the notion of gravitation came into his mind. It was occasion'd by the fall of an apple, as he sat in contemplative mood.



Why should that apple always descend perpendicularly to the ground, thought he to himself. Why should it not go sideways or upwards, but constantly to the earth's centre?

Earlier, Voltaire had written in his *Essay on the Civil War in France* that Sir Isaac Newton walking in his garden had the first thought of his System of Gravitation upon seeing an Apple falling down from the Tree! Apparently, Voltaire's source of information was Catherine Barton.

Who was Catherine Barton? She was Newton's favourite niece, daughter of his half-sister. Reputed to be charming and intelligent, her beauty had been unmarred by the bout of small pox she once had. During her illness she had received medical advice from her uncle Newton who suggested a remedy consisting of 'warm milk from ye cow!' The irreverent poets of Kit-Kat Club of the Whigs wrote of her :

At Barton's feet the God of Love
His Arrows and his Quiver lays,
Forgets he has a Throne above,
And with this lovely Creature stays.

Catherine Barton's name was amorously linked with Charles Montague, Earl of Halifax, who appointed Newton Master of the Mint. Voltaire remarked on this account, 'I thought... that Newton made his fortune by his merit... No such thing. Isaac Newton had a very charming niece who made a conquest of the minister Halifax. Fluxions and gravitation would have been of no use without a pretty niece'. However, we are assured by the historians that this charge is quite baseless, since Montague was not even aware of Catherine's existence when he made the appointment.

On March 22, 1813, Sotheby's held a sale of 'The Library of the late Mrs. Anne Newton, containing the collection of the Great Sir Isaac Newton, etc.' The Library contained books with eyebrow raising titles such as 'The Mysteries of Love and Eloquence' and 'The Arts of Wooing and

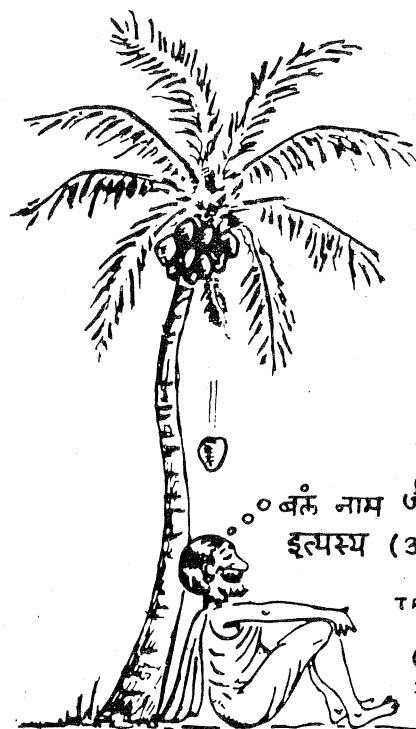
Complementing'. Were these books added to the collection by someone else or did Newton himself own them? After all, Robert Hooke's library contained a number of works with thought provoking titles such as 'Merry Drollery', and 'The Practical Part of Love'. Newton and Hooke, as is well known, had been involved in a controversy related to the discovery of the law of gravitational attraction. Were they perhaps studying, on the sly another kind of fall namely falling in love, trying to discover a universal law of biological attraction and its relation to gravity? We do not know. Einstein, on the other hand, is quite clear on the subject. During a visit to England in 1933, he received a letter from a gentleman who averred that because of gravity a person on the spherical earth is sometimes upright, sometimes standing on his head, sometimes sticking out at right angles to the earth, and sometimes at "left angles". He went on to enquire whether perhaps it was while upside down, standing on their heads, that people fell in love and did other foolish things. Einstein probably did not answer this letter, but jotted down on it in German the following remark:

"Falling in love is not at all the most stupid thing that people do -

but gravitation cannot be held responsible for it."

All our foregoing considerations pale into insignificance in the light of the following obscure but extraordinary fact which invites further investigation requiring generous grants from suitable funding agencies. Legend has it that a sage belonging to South India discovered the universal law of gravitation some three hundred years before Isaac Newton. It so happens that there are hardly any apple trees in South India, but one can find coconut groves all around. Consequently, the discovery of the law of gravitation by our sage was occasioned by the fall of a coconut, as he sat in a contemplative mood beneath the coconut tree. Needless to add, the world remained ignorant of his finding. This was indeed the first authentic case in unrecorded history of perishing without publishing.

Our blurred vision was induced by the following works: Derek Gjerston, "The Newton Handbook"; D. McKie and G. K. de Beer, "Newton's Apple" in Notes and Records of the Royal Society of London, Vol. 9 (1952); H.A. Feisenberger, "The Libraries of Newton, Hooke and Boyle" in Notes and Records of the Royal Society of London, Vol. 21 (1966); Helen Dukas and Banesh Hoffman (eds), "Albert Einstein — The Human Side".



० बलं नाम जी एम एम
इत्यस्य (आर)^२ इत्येतेन
भागः

TRANSLATION:
FORCE IS
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DIVIDED BY (AR)²