James Hutton

Born: 3 June 1726 in Edinburgh, Scotland
Died: 26 March 1797 in Edinburgh, Scotland

James Hutton’s mother was Sarah Balfour and his father was William Hutton. James was born into a wealthy family for his father William was a merchant who held the office of Edinburgh city treasurer.

William owned a 140 acre farm at Slighhouses and a nearby hill farm of 590 acres named NetherMonynut. Slighhouses is west of Berwick-upon-Tweed, about 7 km north of Duns and Chirnside. William Hutton died when James was about two years old and Sarah Hutton was left to bring up James and his three sisters (James had an older brother who died young). Sarah did not marry again, as many women of this time would have had to do, and was able to bring up the family with no financial difficulties.

In 1736, when he was ten years old, James entered Edinburgh High School. There he studied Latin, Greek and mathematics, and in November 1740, at the age of fourteen, he entered the University of Edinburgh.

This was not as remarkable as it now sounds, for at this time the Scottish universities competed with the schools to educate the brightest pupils. At the University of Edinburgh Hutton was taught mathematics by Maclaurin and logic and metaphysics by John Stevenson. He graduated in the spring of 1743, still only seventeen years old.

After graduating, Hutton took a job as an apprentice to a solicitor, but his mind was not on the work as Playfair recounts:

... the young man’s propensity to study continued, and he was often found amusing himself and his fellow apprentices with chemical experiments when he should have been copying papers, or studying the forms of legal proceedings.

Hutton, deciding to take the training, which involved the most chemistry, returned to the University of Edinburgh in November 1744 to undertake medical studies. However before he could begin his second year of studies the 1745 rebellion had broken out and his former lecturer Maclaurin was organising the defence of the city against the Jacobite armies. It was a year before he could resume his studies, which he did in 1746.

In 1747 Hutton fathered an illegitimate child. Probably for that reason he left Edinburgh and went to Paris where he continued this studies at the University.

After a year there he moved again, this time to complete his medical studies in Leiden. After submitting a thesis entitled De sanguine et circulatione in microcosmo to the University of Leiden he graduated with his medical degree on 12 September 1749. It may have been that Hutton never intended to practice medicine as a career, or he may have decided to avoid Edinburgh for a while since that was where his illegitimate son was living. For whatever reason
he returned from Leiden to live in London rather than Edinburgh.

While in London, Hutton corresponded with James Davie who had been a school friend and was still living in Edinburgh. They had made a chemical discovery while students in Edinburgh, discovering a way to make Sal ammoniac, a chemical used in welding metal. In the summer of 1750 Hutton visited Edinburgh, where he and James Davie set up a chemical works. The works was an immediate success and provided Hutton with an income for the rest of his life.

Continuing to live in London, Hutton now made frequent visits to the farm at Slighhouses, west of Berwick-upon-Tweed, which he had inherited from his father. He planned to farm there but decided that first he would make a study of modern farming methods. In 1752 Hutton moved to a farm in Norfolk where he spent two years. These were good years as Playfair recalled:

... there was ... no period of his life to which he more frequently alluded, in conversation with his friends; often describing, with singular vivacity, the rural sports and little adventures, which, in the intervals of labour, formed the amusements of their society.

These were important years for Hutton in another way, for it was during these years that his interest in geology began. We should stress that at this time geology would not have been considered as a science in its own right and Hutton would consider himself as a natural philosopher. Many mathematicians were interested in natural philosophy, and geology in particular. It was around this time that Hutton began to read books on the topic; reading the works Discourse on earthquakes (1705) by Hooke, New theory of the Earth (1696) by Whiston, Protogaea (1749) by Leibniz and Histoire naturelle by Buffon, as well as Steno's treatise Dissertation concerning a solid body enclosed by the process of nature within a solid.

In the summer of 1754 Hutton moved to Slighhouses where he began farming. It was the beginning of a period spanning thirteen years during which he made some trips to Edinburgh but spent most of his time farming and working on his theories of geology. At first he did not seem very happy at Slighhouses but evidence from a letter he wrote to his friend George Clerk Maxwell (the great great grandfather of James Clerk Maxwell) in 1755 suggests that the cause might well have been a love affair which went wrong.

Among other asides in the letter which suggest this, he writes:

O if the ladies were but capable of loving us men with half the affection that I have towards the cows and calves that happen to be under my nurture and admonition, what a happy world we would have.

Hutton returned to live in Edinburgh in 1767, living in the family home with his three sisters. He came back to a city, which was undergoing a revolution in scholarship. Here he joined in the intellectual activity, which was bursting out throughout the city. The most important of his friends were Joseph Black who discovered carbon dioxide, James Watt who made the first practical steam engine, and Adam Smith the economist.

The house in which Hutton lived in Edinburgh now became his laboratory as well as his home and he continued to pursue his theories of the history of the Earth. A visitor to his home wrote:-

His study is so full of fossils and chemical apparatus of various kinds that there is barely room to sit down.

His interest in geology led him to other projects too, and he was a member of the committee of nine who organised the construction of the Forth and Clyde Canal. He joined the committee in 1767 when it was based in Edinburgh where construction of the canal began, and remained
on it until 1775 by which time the committee were based in Glasgow as the construction neared the Clyde.

The age of the Earth was a topic, which, certainly in Europe at that time, was highly religious in nature. The Bible was taken as literal truth, despite the acceptance by most that the Earth revolved around the sun. Scientists such as Newton had expounded much energy working on a chronology of the Earth using the scriptures. The standard date taken for the creation was around 4000 BC and the accepted belief was that Christ was born 4000 years after the creation, the second coming would occur 2000 years after the birth of Christ, and he would reign on Earth for 1000 years. There were two major reasons for this chronology. One was a study of ages given in the Bible of those from the time of Adam and Eve onwards. The second was a literal interpretation of the six days God took to create the world as described in the Book of Genesis together with the quotation that to God one day is like a thousand years.

Hutton looked at the rocks around him to understand the history of the Earth rather than seeking answers from the Bible. Realising that soil is caused by erosion of rocks, he also understood that there is a second mechanism creating rocks beneath the surface, which are then elevated to form new land. He understood that this was an extremely slow cyclic process and that the Earth therefore had to be extremely ancient. However he did not see any mechanism, which would allow him to give even an estimate for this age.

Some time during 1784 the Royal Society of Edinburgh invited Hutton to give two lectures on his theory.

The first of these was arranged to be given on 7 March 1785 but unfortunately he was ill and unable to address the Fellows himself. His lecture concerning the system of the Earth, its duration, and stability, was delivered by his friend Joseph Black. Hutton was well enough to deliver the second of his lectures four weeks later on 4 April. Of course many saw his conclusions as an attack on the Christian Church and some opposed his views vigorously. Hutton’s reaction was what one would expect of an outstanding scientist – he undertook trips to view rock formations to try to gain further evidence to prove that his theory was correct. One such expedition was in the summer of 1788 when Hutton, Playfair, and Sir James Hall sailed down the North Sea coast of Scotland viewing the exposed rock formations in the cliffs.

A printed version of Hutton’s two lectures to the Royal Society of Edinburgh did not appear in print until 1788, but since the further evidence which Hutton had gathered in the years following his lectures is not mentioned one has to assume that the delay was in the printing of the paper in the Proceedings of the Royal Society of Edinburgh. He then worked on a book, which would explain his theory in more detail.
This treatise The theory of the earth appeared in 1795 but sadly it was not nearly such a good book as it might have been since Hutton wrote it during a time of deteriorating health. One also has to add that, even before the severe health problems, Hutton always seemed much more successful in convincing his fellow scientists when he spoke to them than when he wrote. Hutton had a rather peculiar written style of presentation, which made his theory less intelligible, and, as a result, he received less acclaim than he deserved. His style led to many misrepresentations and to attacks from the few who had read the work. It remained to others, particularly Playfair, to present his views more successfully.

As to Hutton's character, Playfair gives this account:

To his friends his conversation was inestimable; as great talents, the most perfect candour, and the utmost simplicity of character and manners, all united to stamp it.

... The simplicity pervaded his whole conduct; while his manner, which was peculiar, but highly pleasing, displayed vivacity, hardly ever to be found among men of profound and abstract speculation. His great liveliness, added to the aptness to lose sight of him self, would sometimes lead him into little eccentricities, that formed an amusing contrast with the graver habits of philosophic life. ... But it is impossible by words to convey any idea of the effect of his conversation, and of the impression made by so much philosophy, gaiety and humour, accompanied by a manner at once so animated and simple.

Playfair's published Illustrations of the Huttonian Theory of the Earth in 1802. He presented Hutton's theories in a different style from that of The theory of the earth. His simple and eloquent style consisted of a series of chapters clearly stating the Huttonian theory, giving the facts to support it, and the arguments given against it. The success of Playfair's presentation can be judged by the fame and credit which have since been given to Hutton, who is now regarded as the first great British geologist. Playfair spent almost five years, from Hutton's death in 1797 until 1802, writing the Illustrations. The majority of his spare time was spent travelling through Britain searching for evidence to support Hutton's theories, having learned on trips made with