TODAY IN SCIENCE: MICHAEL FARADAY

Meet Michael Faraday, the man behind the electric motor and theory of electromagnetism. On September 22 was the anniversary of the birth of British physicist and chemist Michael Faraday in 1791. In spite of a rudimentary education, he became one of history's most accomplished experimental scientists, known for his laws of induction (think of electrical motors, transformers, inductors, generators, solenoids) and electrolysis (using electricity to drive a chemical reaction) and for figuring out the fundamental principles of electro-magnetism (related to light itself).

Michael Faraday in his laboratory at the Royal Institution in the 1800s From a series of watercolors of the great experimental scientist

Faraday was born in England, the third of four children. His father was a blacksmith, who was unable to work regularly due to illness, and his mother was a countrywoman. The family was part of a small Christian sect called the **Sandemanian Church**, which is said to have greatly influenced the young scientist in his views and interpretations of nature. He's known to have said: *Nothing is too wonderful to be true, if it be consistent with the laws of nature, and in such things as these, experiment is the best test of such consistency*.

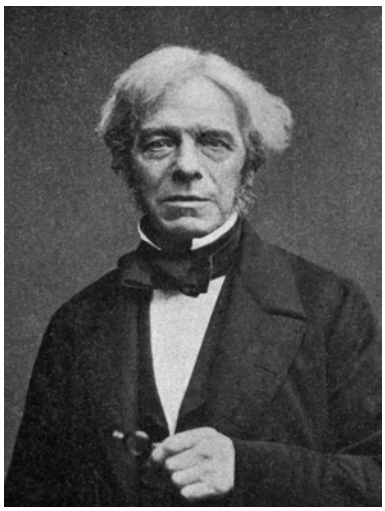
Michael Faraday: I am no poet, but if you think for yourselves the facts will form a poem in your mind

Faraday's education was rudimentary. He attended Sunday school and learned writing and reading. He knew basic algebra and trigonometry. **By age 14, around the year 1805, he was working as a bookbinder's apprentice. This job was critical to Faraday's development as a scientist because it gave him the opportunity to read the books he was binding.**

From the material he read, he was able to perform simple experiments. For example, he built a voltaic pile (precursor to the modern day battery) and performed experiments in electrochemistry with it.

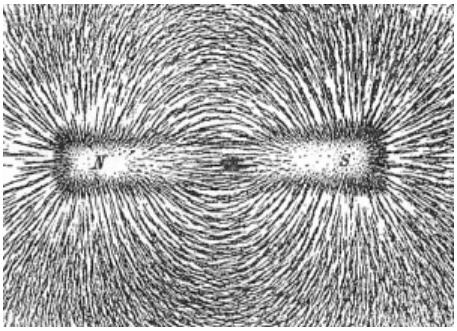
Another key event in Faraday's life occurred when he received tickets to attend the lectures of a famous chemist: **Sir Humphry Davy**. Faraday is said to have drunk in the chemist's words. He sent Davy 300 pages of notes and a request for employment, which he eventually got in 1812. Afterwards, Faraday learned alongside the famous chemist.

By 1820, Faraday had become an expert in chemistry. In fact, his early fame was achieved due to his work in chemistry. He worked on substitution reactions and succeeded in isolating benzene. He created glass with a very high refractive index to improve telescopes as an assignment for the Royal Institution (which still exists today).



Michael Faraday circa 1861 He died in August 25, 1867

It was after he married **Sarah Bernard** in 1821 that he started his research in electricity, magnetism and electrolysis at the Royal Institution. Many discoveries were then being made about electricity by **Orsted** and **Ampere**. These discoveries paved the way for Faraday's discovery of the principle behind the electric motor in 1831. Faraday then built the first electric generator and transformer. He is also the one who came up with the concept of electromagnetic lines of force. Later, **James Clerk Maxwell** used Faraday's observations to create his equations. Faraday is known for many other inventions such as the Faraday Cage and the Faraday Effect. The the ability of a body to store an electrical charge is named him. One farad is defined as the capacitance across which, when charged with one coulomb, there is a potential difference of one volt.



Lines of force shown with a magnet and iron filings via Physics Stack Exchange

Faraday was extremely productive as a scientist, and when asked about his secret for success he said, the secret is to remember three words*: – work, finish and publish.*

AK, with EarthSky Notes