Sir Humphry Davy

Humphry Davy was an amateur scientist, an exemplar 'natural philosopher' searching for knowledge for it's own reward before venality became the mother of invention. He was born in Penzance, a quaint village perched on the southwest tip of England and immortalized by Gilbert and Sullivan in the '*Pirates of Penzance'*,on the 17th December 1778. His father, a woodworker of some renown, had a small residual income which enabled him pick and choose his projects, an independence and creativity that may well have influenced young Humphry. Both his mother's parents had died when she was young and she had been adopted by a local but eminent surgeon, John Tonkin. After the family moved to their estate, Humphry often went to stay with Mr. Tonkin while attending school in Penzance. The teacher there recognized Humpry's ability and he was soon removed to Penzance Grammar school.

A precocious child, Humphry exhibited a passion for literature and history, often climbing on a wagon to declaim the latest tale he had read to his eager classmates. Only 8 years old, he had charisma, "the applause of my companions is my recompense for punishments incurred for being idle." Living nearby was a saddler called Robert Dunkin who also had a bent for science; he built an electrical machine, Leyden jars, voltaic piles and various models to illustrate the principles of mechanics. Reading and hanging around Dunkin constituted most of Humphry's education.

When he was 16 his father died and the following year John Tonkin had him apprenticed to another surgeon, John Borlase, where he worked as a chemist in the apothecary's dispensary; as much experimenting as following instructions. One winter's day he demonstrated to Dunkin how two pieces of ice rubbed together would generate heat through friction.

In short order, he met Davies Gilbert, who allowed him access to his extensive library; Dr. Edwards, a lecturer at St Bartholomew's Hospital, who gave the young lad access to his laboratory; Gregory Watt, the son of James Watt of steam engine fame, and Thomas Beddoes and Professor Hailstone, two prominent scientists in the new field of geology. Beddoes was in the process of founding the Pneumatic Institute, in Bristol, and needed an assistant to help run the laboratory, Gilbert proposed Humphry Davy. Gregory Watt sealed the deal by giving Beddoes a copy of 'Young Man's Researches into Heat and Light', which Davy had written at the tender age of 19! The institute was founded to investigate the medical powers of factitious airs and gases and Davy was to supervise all experiments.

Two more books followed, detailing his work such as the purification of nitrous oxide or laughing gas. The Earl of Durham, known as Radical Jack, was a patient at the institute, and he also met Robert Southey and Samuel Taylor Coleridge. His published work was also gaining attention. In 1799 Count Rumford had set up the Royal Institute, an '*Institution for Diffusing Knowledge*'. The first lecturer, Dr. Garnett, had to step down owing to ill-health. Davy's name was proposed and he was elected as assistant lecturer, director of chemistry and assistant editor of the Institute's Journals. The salary (100 pounds plus a room in the house on Albemarle Street, London, plus coal and candles) enabled him to concentrate on his experiments. The following year, 1801, he was nominated Professor of the Royal Institute, and this with no college education.

Davy was a great pioneer in the field of electrolysis. Using Voltaic piles he was able to isolate a whole series of metals starting in 1807; sodium, potassium, magnesium, calcium, boron and barium. Some 30 years before the brilliant Swedish chemist and tinkerer had discovered chlorine which he called dephlogisticated marine acid, this harked back to Priestley and the idea of phlogiston or soul of the air. Davy was able to prove that chlorine was an element (it was Humphry who named it), and, thus contained no oxygen. He also demonstrated that oxymuriatic acid, HCl or what we now call Hydrochloric acid, contained no oxygen, in the process upsetting Lavoisier's whole definition of acids as compounds of oxygen. Unfortunately, his work with chlorine, specifically nitrogen trichloride, a compound with similar properties to tear gas and later used to bleach flour, caused him to almost lose his eyesight in an explosion (another scientist, Pierre Dulong, had already lost two fingers and then an eye in two explosions with the same substance, one would think they would learn!)

By 1812, the date of the accident, both Davy's work and lectures had earned him considerable acclaim and he hired Michael Faraday to assist him. That same year he was knighted and gave a farewell lecture to the Royal Institute and married Jane Apreece, a widow with a considerable fortune; not a happy marriage, she seems to have married Humphry principally to gain the title Lady Davy and was unfailingly rude to Faraday who she treated as a lower servant.

Demonstrating the global nature of science, Davy was invited to France to receive a medal from Napoleon, another who was fascinated by the field, in recognition of his electro-chemical work. While in Paris he was asked to look at a substance which he proved to be an element he called iodine. Davy and Faraday travelled on to Florence where they used the sun's brighter rays (this would never have worked in rainy old England) to burn diamond, proving it to be pure carbon. They went on to Rome and Milan, meeting Alessandro Volta, and Munich, Geneva and Innsbruck, consulting with the finest scientific minds of their day. The trip was cut short after Napoleon, imprisoned on the Mediterranean isle of Elba, managed to escape and landed in France, raising an army.

Back in England, Davy turned his attention to more practical matters such as the problem of coal gas in mines. The Industrial Revolution was gathering momentum and mine explosions were causing great loss of life (and productivity!) Sir Humphry devised a wire gauze shield for the flame, which, while losing

some luminosity none the less proved efficacious in reducing mine deaths. The Davy Safety lamp is what he is best remembered for, the first model for which he introduced in 1816, refusing a patent. He did however receive the Rumford medal and, in 1819, was awarded a baronetcy for his work, including several treatises on the nature of acids relating to hydrogen, very influential works throughout the 19th century. Soon after he was appointed the President of the Royal Society. He continued to work with Faraday, a genius who would become more famous than his mentor; Davy said that his greatest discovery was Michael Faraday.

Davy died in Geneva, Switzerland on the 29th May, 1829, still only 50 years old. Death was hastened by the years of inhaling noxious gases and fumes from his experiments. Early in his life he had thought that he would be a poet, Coleridge said that if Davy had not been first in chemistry he would have been first in poetry. A brilliant creative mind, totally self taught, he was truly a pillar of science.

Sources : Treneer, Anne (1963). *The Mercurial Chemist, A Life of Sir Humphry Davy*. London: Methuen.
Knight, David (1992). *Humphry Davy: Science and Power*. Cambridge, UK: Cambridge University Press.

"On Some Chemical Agencies of Electricity

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- Did You Know:

Sir Humphry Davy became addicted to laughing gas, he said it had all the benefits of alcohol but was devoid of it's flaws.