The Royal Institution celebrates bicentennial*

It is two hundred years now since the Royal Institution of Great Britain was born in 1799. The agreement to found the Institution was arrived at, at a house situated at Soho Square, of Joseph Banks, the then President of Royal Society and one of the founders of the Institution. A Royal Charter was granted by King George III in early 1800. By the end of July 1799, the property at 21 Albemarle Street was purchased for housing the Institution. The building, which had been the town house of a gentleman, was converted into a scientific institution with laboratory space, a lecture theatre, library and offices.

The institution was founded 'For diffusing the knowledge, and facilitating the general introduction of useful mechanical inventions and improvements; and for teaching, by courses of philosophical lectures and experiments, the application of science to the common purposes of life'.

The first lecture at the Royal Institution was delivered by Thomas Garnett, the first Professor of Chemistry at the Royal Institution, in March 1800. The early days of the Royal Institution saw a lot of utilitarian work, concerned with improving agriculture by the use of chemistry. Such utilitarian work, lectures and applied research continued through the nineteenth and twentieth centuries. In order to give a broader public appeal, demonstrations of spectacular, entertaining and often dangerous scientific experiments were staged for the public. In this context two names who set up a tradition that has lasted over two centuries stand out, namely that of Humphry Davy and Michael Faraday.

Humphry Davy (b. 17 December 1778, d. 29 May 1829) was in fact appointed as a lecturer in 1801 to arrange the demonstrations. But he was soon appointed Professor of Chemistry following the death of Garnett in 1802. Davy's chemical lectures and demonstrations were brilliantly presented and became a fashionable social event. He also wrote a book on agricultural chemistry and presented the first systematic geology course offered in England. His first Bakerian Lecture won a prize from Napoleon, even though France and England were at war. Davy used electrolysis to obtain elemental potassium and sodium in 1807 and calcium, strontium, barium, and magnesium in 1808. He obtained boron simultaneously with Joseph Louis Gay-Lussac. He also showed that oxygen could not be obtained from the substance known as oxymuriatic acid and proved the substance to be an element, which he named chlorine. Much of Davy's subsequent research involved making new compounds of chlorine with nitrogen, phosphorus and oxygen. In 1812 he was knighted. He resigned from the Royal Institution in 1813 and travelled around the continent with his wife and young Michael Faraday. Subsequently Davy returned to London to study flames, and during this time he invented what came to be called the Davy safety lamp. He was made a baronet in 1818. During his years at the Royal Institution, Davy conducted important experiments and established that scientific research would be a crucial function of the Institution.

Listening to one of Davy's final lectures in 1812 was Michael Faraday. Faraday was born on 22 September 1791 at Newington, Surrey, near London. At the age of fourteen he was apprenticed to a London bookbinder. Reading many of the books in the shop, Faraday became fascinated by science. After hearing the lecture by Davy, Faraday sent him the notes he had made of his lectures and wrote a letter asking for a job. As a result, Faraday was appointed, on 1 March 1813, at the age of 21, as assistant to Davy in the laboratory of the Royal Institution. There Faraday immersed himself in the study of chemistry, becoming a skilled analytical chemist. Faraday made immense contributions to science. Most notable amongst Faraday's achievements and discoveries are electro-magnetic rotations, the liquefaction of gases, the discovery of benzene, electro-magnetic induction, the laws and nomenclature of electrochemistry, the magneto-optical effect, diamagnetism and the field theory of electro-magnetism. However, his lesser known utilitarian works progressing at the same time, were an alloying technique to improve steel and the implementation of electric lights in lighthouses in the 1850s and 1860s.

Michael Faraday was also an initiator of many of the traditions of today's Royal Institution. Faraday was the greatest scientific lecturer of his day, who did much to publicize the great advances of nineteenth-century science and technology through his articles, correspondence and the Friday evening discourses which he established at the Royal Institution. The Royal Institution Christmas lectures for children, begun by Faraday, continue to this day. The Friday Evening Discourses are formal lectures given to members and their guests with wide-ranging scientific topics. The work presented was always up to date and the tradition of providing entertaining (but now less dangerous) demonstrations still flourishes. J. J. Thompson actually first he announced the existence of the fundamental particle, later called the electron during his Discourse in April 1897.

The greatness of Faraday lay in the fact that he was of humble origin, with little formal education, and yet he made his great discoveries by observing the natural world and working to understand its mysteries. He was most deeply interested in fundamental research, the very ideal of a scientist. His chemical work was overshadowed by his electrical discoveries of which the first notable one in 1821 was the continuous rotation of magnets and current-carrying wires. His crowning achievement came in the autumn of 1831 with the discovery of electro-magnetic induction. In fact his work laid the foundations for all subsequent electro-technologies, which led directly to the modern electric motor, generator and transformer. In 1832, he proved that the electricity induced from a magnet, voltaic electricity produced by a battery, and static electricity were all the same. He also did significant work in electrochemistry, stating the First and Second Laws of Electrolysis. This laid the basis for electrochemistry.

During his career, Faraday was promoted to Superintendent of the House (1821), Director of the Laboratory (1825) and Fullerian Professor of Chemistry (1833) at the Royal Institution.

Faraday's understanding that the natural world is the reflection of the divine was expressed in his famous

*This news item is based on information available in several websites.

statement that 'The book of nature which we have to read, is written by the finger of God'. Bence Jones in his biography *The Life and Letters of Faraday* has written 'His standard of duty was supernatural. It was formed entirely on what he held to be the revelation of the will of God in the written word, and throughout his life his faith led him to act up to the very letter of it'. There was a simplicity and unselfconsciousness about Faraday, a great and simple man, kindly, entirely free from pride and undue self-assertion. Although he enriched the world as few others have been privileged to do, he remained a poor man to the end of his life. Many consider him the greatest experimentalist who ever lived. Several concepts that he derived directly from experiments, such as lines of magnetic force, have become common ideas in modern physics.

Faraday was twice offered the Presidency of the Royal Institution which he returned. He was also offered a knighthood, but he refused commenting, 'I must remain plain Michael Faraday to the very last'. He accepted with grace a house awarded by Queen Victoria, on Hampton Court Green, where he spent his last years – a devout and caring man and perhaps England's greatest scientist, chemist, electrician, philosopher, member of the Sandemanian Church of Christ, and an inspiration to future generations.

Helmholtz said of Faraday 'It is indeed remarkable in the highest degree to observe how, by a kind of intuition, without using a single formula, he found out a number of comprehensive theorems which can only be proved by the highest powers of mathematical analysis'.

Faraday discontinued research in 1855 because of declining mental powers, but he continued as a lecturer until 1861. A series of six children's lectures published in 1860 as *The Chemical History of a Candle*, has become a classic in science literature. In 1865, Faraday ended his connection with the Royal Institution after over 50 years of service. He died at his house at Hampton Court on 25 August 1867.

A large number of other eminent scientists have worked at the Royal Institution. Research at the Royal Institution has been taking place in the Davy–Faraday Research Laboratory at the original site in Albemarle Street. As a distinguished centre of excellence, it has had to its credit as many as fifteen Nobel Laureates.

John Tyndall made important contributions to the science of crystals and also studied the nature of glaciers. In addition, he acted as a public spokesman for science during the Victorian period. Lord Rayleigh discovered argon. He also carried out important work in the fields of optics, electro-dynamics, electromagnetism, hydrodynamics, viscosity, and of course, light-scattering for which he won the Nobel Prize in 1904 while he was Professor of Natural Philosophy at the Royal Institution. James Dewar invented the vacuum flask, more familiar as the thermos flask. William Henry Bragg and William Lawrence Bragg were pioneers of X-ray crystallography. Another Nobel Prize winner, Lord Porter, is a world leader in the field of high speed chemical reactions. Porter founded the extremely successful Mathematics Masterclasses in 1979.

Scientific research carried out in the laboratories of the Royal Institution currently covers areas such as superconductivity, catalysis, magnetism and surface science. There are three research groups led by Peter Day, Richard Catlow and John Meurig Thomas, with nearly 40 graduate students, postdoctoral students, research fellows and visiting scientists working in various aspects of solid state chemistry. Currently, Susan Greenfield is the Director of the Royal Institution; she is the first woman to be appointed as Director.

To celebrate the Bicentennial Year, the Royal Institution is presenting a number of extra Lectures and Events this year. A series of monthly lectures will be held, all presented by young scientists under 40 years of age and well-known in their fields. The Royal Institution Centre for the History of Science and Technology, as part of the celebrations, will devote 9 evenings to topics relating to the history of the Royal Institution and those who worked in it. In a series of four sessions, scientists will discuss some of the most prominent and interesting issues today including 'Drugs', 'Women in Science', 'Science and Religion', and 'Consciousness'.

NIH plans global electronic biomedical database

The much needed global electronic biomedical library may soon become a reality. The National Institutes of Health (NIH), Bethesda has just unveiled a draft plan that would create an unprecedented global electronic publishing venture covering all the biomedical sciences. This ambitious web-based publishing initiative is expected to radically change the way biomedical scientists interact for disseminating new information, share knowledge and retrieve available data.

Christened 'E-Biomed', this worldwide online preprint publishing proposal was presented by Harold Varmus, the director of the NIH before the US House Subcommittee for Education, Labour and Health and Human Services during the NIH budget review. The draft 'E-Biomed: A proposal for electronic publishing in the biomedical sciences' was prepared by Varmus himself. This facility is expected to provide readers free access to clinical research, medically-related behavioural research, cell and molecular biology, bioengineering, and other disciplines allied with biology and medicine. The proposal concludes: 'The rise of the Internet offers an unprecedented opportunity to change the scientific publishing in ways that could impose on virtually all aspects of the current system'.

The stated goal of this project is to short circuit the existing print-on-paper journal system and centralize most of world's biomedical literature at a single website. This repository would thus accept all papers in every area of biomedicine, and more importantly, provide free access to the full text to all readers. It is expected to overcome many existing drawbacks of the scholarly communication system, especially the high costs of maintaining a plethora of high-cost, low circulation journals which are forcing librarians to cut back on subscriptions, starving the researchers of current information. In addition, this global archive is expected to seamlessly integrate, the highly fragmented and compartmentalized knowledge-bases. The E-biomed has been conceptualized by a small group of researchers and database experts who have been trying hard to