BRIEF BIOGRAPHIES OF SOME OF THE EARLY ELECTRICAL SCIENTISTS

GALVANI, Luigi. Born Bologna 1737, died there 1798. Discovered animal electricity. Galvanometer named after him. Anatomist; Professor of Anatomy and Gynaecology at Bologna 1775. Observations of twitchings of frog laid out for dissection on a table on which was also an electrical machine, 1791.

VOLTA, Alessandro. Born Como, Italy 1745, died there 1827. Inventor of electric battery. The electrical unit "volt" named after him. Came from aristocratic family. Wrote first paper on electricity when 24. Professor of Physics at Como 1775, at Pavia 1778; Rector at Pavia 1795, sacked for political reasons 1799, later reinstated when French took over N.Italy. Retired 1815. Did little electrical work after 1800.

DAVY, Humphry. Born Penzance 1778, died at Geneva 1829. Best known as chemist, discovered sodium and potassium, invented a miner's safety lamp at same time as Geo.Stephenson. Very ordinary at school, but from 16 onwards developed rapidly. Apprenticed to a surgeon-apothecary, Mr. Borlase, who guided his reading. In 1798 he was appointed assistant at Pneumatic Institution at Bristol and worked on anaesthetic gases. In 1801 offered post as Asst.Lecturer under Count Rumford at Royal Institution, Professor of Chemistry there 1802. Made a big reputation. Worked largely on electrochemistry and on electric arcs, using voltaic battery of 2000 pairs of plates for latter. Appears in general to have had pleasant personality, encouraged Faraday, but in dealing with Geo.Stephenson and his supporters in 1815 (in regard to rival invention of miner's safety lamp) appeared very arrogant and conceited.

Knighted 1812 (age 33), married a rich Scottish widow same year, embarked on a series of continental tours, and achieved much less of scientific value thereafter.

OERSTED, Hans Christian. Born in Denmark 1777, died in Copenhagen 1851. Discovered magnetic effect of electric current. Electromagnetic unit "oersted" named after him. Son of an apothecary. Brilliant young man (his younger brother was too, but became a jurist and statesman) and was interested not only in natural science and medicine but also in

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aesthetics, philosophy, etc. Got Ph.D. at 22 in metaphysics Professor of Physics at Copenhagen 1806 - 1851. Regarded as a man of high character, modest and helpful. Retained his interest in philosophy, travelled a good deal to meet other scientists. Very highly honoured, F.R.S.

AMPÈRE, André Marie. Born Lyons, France 1775, died Marseilles 1836. Showed remarkable insight into electromagnetism. Unit of current, "ampere", named after him. His father was guillotined in the "terreur" of the French Revolution, and this seriously deranged him mentally (at the age of 18) for his father had been a great companion, his principal teacher too. He recovered, fortunately. Married 1799, but lost his wife in 1804, and then moved to Paris. Had various academic appointments. Lecturer in mathematical analysis at Ecole Polytechnique 1804, Inspector-General of Imperial University. 1808, Professor of Mechanics at Ecole Poly. 1809. F.R.S. 1827.

OHM, Georg Simon. Born Bavaria 1789, died in Munich 1854. Discovered "Ohm's Law", and the unit of resistance, "ohm", is named after him. Various academic positions; in 1817 made Head of Dept. of Maths & Physics at Polytechnic Institute of Cologne; 1826-33, Military Academy, Berlin; 1833, Professor of Physics at Poly.Inst. in Nuremberg; 1849, Professor of Physics at University of Munich.

Ohms Law announced 1826, including idea of internal resistance of a battery. It was also Ohm who discovered that the human ear automatically analyzes any periodic sound into its component tones. But both his big discoveries attracted little notice at the time.

STURGEON, William. Born in Lancs. 1783, died there 1850. A practical engineer rather than scientist, he was the first to make a practical electric motor, electromagnet, and commutator. Born in humble circumstances, became private soldier, self-educated; then bootmaker. But in 1824, Lecturer in Science at Roy.Mil.Coll. Went to Manchester 1840, died in poverty.

HENRY, Joseph. Born Albany, New York, 1797, died in Washington 1878. Unit of inductance, "henry", named after him. Professor of Maths at Albany Academy 1826. Professor of Natural Philosophy at Princeton 1832. In 1846 became first Director of Smithsonian Institution. He improved Sturgeon's electromagnet. 1830, discovered self-induction, but did not publish and so Faraday got priority. Did a lot of work on telegraphy.

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FARADAY, Michael. Born at Newington, Surrey 1791, died London 1867. Discovered benzene, the dynamo, etc. The unit of capacitance, the "farad", is named after him. He was the son of a poor blacksmith, his formal education comprised just the 3 R's, he was brought up in a dissenting religious sect. At 13 or 14 he was apprenticed to a London bookbinder and bookseller in Blandford St.,Marylebone. His father died when he was about 19.

Faraday now worked among books, and he read them omnivorously, keeping careful notes. Electricity appears prominently in these. The Secretary of the Athenaeum was a visitor to the shop, and one day found the young man engrossed in reading a book he was binding. Engaging him in conversation, he found him studying the article on electricity in the Encyclo.Britan. and very fully informed on this and other subjects, being a "self-taught chemist of no mean pretensions". Not only did he read and make notes, but he carried out experiments as far as his resources would allow. He constructed a machine to generate static electricity and also a voltaic faile.

Another visitor to the bookshop was a Mr. Dance, who also noticing Faraday's thirst for scientific knowledge, got him tickets for 4 public lectures being given at the Royal Institution by Sir Humphrey Davy in 1812. He attended with excitement, and took full notes of the lectures. He then copied them out carefully, bound them complete with a title page and dedication to Davy, and presented them to him. Davy was impressed, wrote kindly to Faraday and arranged to meet him. Faraday was appointed assistant to Davy at 25/- a week with the use of two rooms at the top of the house. So began his real scientific career. It was primarily in chemistry, and concerned with atomic theories of chemical reactions and properties. He discovered benzene in 1825. But his electrical work was his most important contribution. Apart from his experiments of 1821 and 1831 which showed the basic ideas later developed as the transformer, alternator and d.c. generator, he outlined a basic concept of Field Theory - rejected by most of his contemporaries with the notable exception of James Clerk Maxwell.

In personal matters, Faraday was of retiring disposition, devoting himself to his work at the R.I. and to his wife. But he was a fine popular lecturer at the Friday Evening Discourses.

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EDISON, Thomas Alva. Born at Milan, Ohio, 11 Feb.1847. Died at West Orange, N.J, 18th October 1931. Dutch and Scottish stock. Great-grandfather lived in U.S.A., but fled to Canada soon after formation of United States. Father fled back to U.S.A. as a rebel against Canadian Govt. in 1837.

Thos. received only a rudimentary education, from his mother, because he was slow at school and poor in maths! At 10 he was doing experiments in chemistry, but also selling vegetables and newspapers. At 12 he was an employer - of other boys. From 16 to 21 (1863-8) he roamed the country as a telegraph operator (Civil War raging 1861-5) living rough. By chance he acquired the works of Michael Faraday, which improved his understanding of electricity.

First patented invention 1869 - an electrographic vote recorder - aroused no interest. That year he went to New York without job or money, interested himself in the improvement of stock-ticker apparatus and made himself useful to the Gold Indicator Co. and got valuable experience. He set up a firm of "electrical engineers" (said to be the first professional use of the term) with a friend and improved the stock-ticker in various ways - he eventually held 46 patents in this field alone.

1870 - firm sold at big profit. At age of 23 Edison set up a business of his own, employing 50 in the manufacture and improvement of telegraphic and other apparatus. It was indeed an invention factory. It expanded into specially-designed premises at Menlo Park in 1876 and at West Orange in 1886. He at times had as many as 50 inventions under development at the same time.

1874 Edison invented the diplex method of telegraphy, which combining with the already established duplex system enabled four telegraph messages to pass over a single wire. N.B. The duplex system used either a Wheatstone bridge or a differential transformer to enable transmission and reception in both directions simultaneously over same wire. Edison's diplex enabled two channels to be used in each direction by coding one with reversals of current and the other with doubling of current magnitude.

1877 Edison invented the carbon transmitter for telephony. Bell and Gray had conceived the idea of modulating current by a variable resistance in a battery circuit, but their practical implementation of the idea was not very suitable. The Western Union Co. (U.S.A), seeing the big commercial possibilities of telephony, commissioned Edison to invent improved equipment. He did so. The variable resistance between carbon contacts was very suitable

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for a practical telephone transmitter, and Edison set up his own Edison Telephone Co. in London, with three exchanges. To avoid Bell's patents on the electromagnetic telephone receiver, Edison invented a receiver of a most ingenious kind, using a rotating chalk cylinder moistened with potassium iodide, and dragging on it a platinum point connected mechanically to a mica diaphragm. Edison knew that variation of current through the point varied the drag, and he thus obtained vibration of the diaphragm in sympathy with the current variations - and thus produced intelligible sound.

1877 also saw Edison's most original invention, the phonograph or gramophone. He embossed the sound signals on a cylinder covered with tinfoil by means of a needle connected mechanically to one diaphragm, and reproduced the sound with a similar device. But it was over 10 years before he overcame the mechanical crudity and developed a commercial proposition.

Edison turned to perfecting the incandescent electric light bulb, of which the construction was being rapidly advanced by Sir Joseph Swan in England (Swan born Sunderland 1828, died 1917). Swan made a carbon-filament lamp in 1878, manufacturing them commercially in 1881. He made the filaments by carbonizing mercerized cotton threads. Edison independently developed a similar process and had patent conflict with Swan which was resolved by the two men joining forces in the Edison and Swan United Electric Light Co.Ltd. of London - the famous "Ediswan" firm. It was in this work that Edison discovered the "Edison Effect", i.e. the action of a vacuum lamp as a diode valve. Edison did not, however, develop a useful thermionic valve from this. (It was J.A. Fleming who did this independently).

1881, Edison constructed the first central power station, at Pearl Street, New York. (He was very much concerned with the usefulness of technology to society.)

1891, he made the first connercial motion pictures, using 35 mm celluloid film, 46 pictures/sec, 4 perforations to align each picture.

At the turn of the century he made a most expensive investigation of magnetic separation of iron ore, which proved financially catastrophic because new ore finds rendered the method uneconomic. He went on to study cement manufacture and developed new uses for concrete.

He developed a very successful electric storage battery, and went into office machinery. In the 1st World War he did research for the U.S. Navy on torpedos, flame-throwers and periscopes. And even later he turned to rubber production!

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Edison as a man. He was handicapped by deafness attributed to an accident while young. He had boundless energy and untiring intellectual curiosity. He had a vast experience of people and was a good judge of them. American Society helped him through its appetite for novelties, its abundant natural resources allied to a limited labour supply. He had 1097 patents, but it is said that he was not a great man of science nor even an inventive genius of great inspiration. "Perspiration" was his characteristic; he often worked 20 hours a day.

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