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FARADAY EXPERIMENTS OF 1831
AND SPACE ENERGY
By Hal Fox, Editor

BACKGROUND

Michael Faraday (1791-1867) was one of the foremost experimenters in the scientific world. His numerous papers read before the Royal Society, and published in the *Transactions of the Royal Society,* and later published in three volumes (1844, 1847, 1855) are superb examples of experimental science. Although Faraday: is honored by today's scientists, he was not properly educated to be con. considered a scientist in his day. At the age of 12 he became an errand boy for : a bookseller/bookbinder. His education began while Winding books. which he read in the hours after work. He gained his first education about electricity from the *Encyclopaedia Britannica* and from Mrs. Marcet's *Conversations on Chemistry.* He bought materials with scarce spare funds and at the age of 21 (1812) he began experiments in electrolytic decomposition. He attended four lectures by Sir Humphry Davy, took notes, carefully transcribed and bound the notes, and presented them to Davy with a request for employment, He became a lab assistant to Davy in March 1813. in 1815 he added research activities of his own choosing and published his first paper in 1816. In 1821 he began work with electromagnetism. with his experimental findings meticulously recorded in numbered paragraphs and with appropriate drawings. In 1831 he started the first section of *Experimental Researches in Electricity.* **All experimenters should read, study, and emulate The experimental procedures and reporting methods of Michael Faraday.**

FARADAY'S FINDINGS REVISITED

In his First Series, Article 2. *On the Evolution of Electricity from Magnetsm,* **Faraday states** (paragraph 30) [for helical coils of copper wound on an iron ring] "The deflection on making a battery contact always indicated an induced current in the opposite direction to that from the battery; but on breaking the contact the deflection indicated an induced current in the same direction as that of the batter?." This effect has been compared to inertia (see lead article **p.2** this issue). If Faraday had been aware of space energy, and that it can only be tapped from an accelerated frame of reference. he might have concluded that only when an electrical current is accelerated (or decelerated) will there be exhibited the effect of electrical induction. He further could have: stated that the direction of the change in acceleration (or deceleration) determines the direction of the induced current.

In paragraph 34 Faraday reports on the use of cylindrical coils and notes the difference between a hollow (air) coil arid a coil with an iron bar in the center: "Rut when a soft iron cylinder seven-eights of an Inch thicic, and twelve inches long, was introduced into the pasteboard tube. surrounded by the helices, then the induced current affected the galvanometer powerfully and with all the phenomena just described (see para 30). It possessed also the power of making magnets with more energy, apparently, than when no iron cylinder was present." Faraday also found the following: When copper replaced the iron only the effect of the air coil was noted. Bar magnets could be demagnetized Or have their magnetism reversed by inserting them in the coil and connecting the coil to a battery. A magnet, thrust into or withdrawn from the coil, would Induce a current through the gatvanometer with opposite directions for opposite motions. (paragraphs

35.43). What would an advocate of space energy conclude from these experiments? Possibly the following:
The property of magnetic materials, when magnetized. has the capability of changing the structure of space energy so that electrical induction is greatly increased. This property of magnetic materials can be modified, especially in its direction (polarity) by current flowing through a coil. therefore, electric current flowing through a coil exhibits a similar aligning effect upon space energy. The process of modifying the alignment of space energy couples space energy into electrical coils thus inducing an electric current. Electric induction can therefore be attributed to changes in the alignment of space energy.

Faraday next performed experiments with a large permanent magnet and concluded at the end of Article 2. in paragraph 58: "The similarity of action between common magnets and either electro-magnets or volta-electric currents ... furnishes powerful reasons for believing that the action is the same in both cases; ... I propose to call the agency thus exerted by ordinary magnets, *magneto-electric* or *magnelectric* induction." Faraday later reports on his experiments in which he rotated a U plats (11/21/96 don't know what the previous word is, can't locate the original document-BSW) 12-inch copper disk between the poles of a magnet and generated electricity from the hub to the outer periphery of the disk. The current flows in opposite directions tInt (?, BSW) when the direction of rotation is reversed or if the magnetic poles are reversed. In Article 4, paragraph 101, Faraday states: "It is now evident that the rotating plate is merely another form of the simpler experiment of passing a piece of metal between the magneuc poles in a rectilinear direction, and that in such cases: currents of electricity *are* produced at rights angles to the direction of motion, and cm.ssing (? BSW) it at the place of the pole or poles"

SOMETHING YOU DIDN'T LEARN IN SCHOOL

In Article *6 "General Remarks and Illustrations of the Force and Direction of Magneto-electric Induction, "* paragraphs 217 & 218, Faraday questions whether it is necessary for there to be relative motion between the magnet an41 the. conductor to establish induction. According to the principles of electricity and magnetism as is taught in high schools and colleges, it is immediately evident that without magnetic lines of force (whatever they are) cutting the conductor, there would be no electrical current produced. Faraday took an ordinary cylinder magnet and cemented on the end a copper disk with insulating paper intervening. He reports: "...the magnet and disk were rotated together and the collectors ... brought in contact with the ... [rim and hub]. The galvanometer needle moved as in former cases. and the direction of motion was the same as that which would have resulted, if the copper only had revolved, and the magnet been fixed. Neither was there any apparent difference in the quantity of deflection. Hence. rotating the magnet causes no difference in the results." This basic experimental fact is seldom taught in either high school or college!

Knowing that an entergetic space pervades all space and manner, how would One explain magneto-electric induction? Here: is a suggested approach: A magnetic field aligns or modifies space energy such that if a conductor is moved through that modified space energy field. electrical current is caused to flow in the conductor. Note that this explanation says nothing about "cutting magnetic lines of force." This explanation implies, that regardless of how the space energy is aligned or modified the mere motion or rotation of a conductor, in that modified space energy field, will be sufficient to induce an electric current.