

HEALTH AND STRESS

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BIOELECTROMAGNETIC FIELDS OF HEALTH & LIFE

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Everyone knows what electricity and magnetism are and it's easy to describe some of their effects. On the other hand, most of us would have difficulty in defining these terms or explaining precisely how electricity can be converted into heat, light and sound or why a magnet always has two opposite poles no matter how you try to divide it. Deciphering how atmospheric electromagnetic forces or those generated internally affect us is even more complicated. **Electrical energy is clearly linked to life. The ultimate criterion for death is the lack of evidence of any electrical activity and in humans, the usual standard is the absence of any electrocardiographic activity.**

The power of electricity has always fascinated mankind. The ancient Greeks believed that Zeus, their most powerful God,

was responsible for thunder and lightning. The Romans also presumed that Jupiter hurled his lightning thunderbolts to punish the wicked or warn the Empire of its errant behavior.

The Persians similarly believed that lightning manifested divine wrath and in the Old Testament, thunder and lightning were viewed as manifestations or messengers of God. Australian aboriginal rock carvings depicted the "Lightning Man" deity Namarrgon wearing lightning as a band connecting his arms, legs and head with stone axes on his knees and elbows that made thunder. When Namarrgon wanted to make lightning he would strike these axes on the ground or against the clouds and the resulting lightning bolts were his children, or Aljurr, which meant "little lightning". The Egyptian god Seth was portrayed as creating lightning with his iron spear.

In Scandinavian mythology, Thor created lightning. Whenever this omnipotent fiery red-haired Norse god hurled his magic hammer earthward to indicate his displeasure it would send lightning sparks flying all over. The oak tree was thought to be sacred to Thor and was called the "thunder tree" since it presumably afforded protection from thunder and lightning. Many seeking the shelter of an oak tree for safety

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during a thunderstorm learned the hard way that this was not the case. People still kept oak branches in their houses to ward off dangerous natural forces and those from oak trees that had been struck with lightning were particularly prized because of the equally mistaken belief that lightning would never strike twice in the same spot.

Acorns, Lightning Rods And Electricity

Acorns eventually replaced oak branches as protection and a vestige of this fetish can still be seen in the acorn-shaped knobs found at the end of some window shade cords. During the Middle Ages some believed that ringing church bells would disperse lightning and many medieval church towers actually bore the inscription *Fulgura frango* (I break up lightning). That theory also proved dangerous to the bell ringer according to a medieval treatise entitled "Proof That The Ringing Of Bells During Thunderstorms May Be More Dangerous Than Useful". The author reported that over a 33-year period, a total of 386 lightning strikes on church towers had killed no less than 103 bell ringers.

The 325-foot bell tower on Campanile of St. Mark's Church in Venice, Italy is a good example of this myth as well as the erroneous notion that "lightning never strikes twice." The tower took its first lightning hit in 1388, was completely destroyed in 1417 and again in 1489 by lightning strikes. Several more strikes were recorded in succeeding centuries and in 1745, a powerful bolt of lightning brought the entire structure crashing down. In 1766, a lightning rod that had been designed by Benjamin Franklin was installed and there have been no lightning strikes or damage ever since.

Franklin performed the first systematic, scientific study of lightning during the second half of the 18th century. Electrical science had developed to the point where positive and negative charges could be separated. By rubbing two different materials together these charges could be stored in a primitive capacitor called the Leyden Jar. This was a glass jar coated inside and outside with tinfoil whose electrical energy could be discharged by touching the inner and outer foil layers

simultaneously. This would produce a mild shock but if a metal conductor was used, a spark could be seen and heard.

Franklin wondered whether lightning and thunder were also the result of a much more powerful electrical discharge. He theorized that clouds were charged with electricity and while others had previously noted the similarity between laboratory sparks and lightning, Franklin was the first to design an experiment that conclusively proved the electrical nature of lightning. In 1752, he flew a kite with a metal tip during a thunderstorm. At the end of the conducting wet hemp line used to fly the kite he attached a metal key, to which he tied a non-conducting silk string that he held in his hand. Franklin's grounded body provided a conducting path for the electrical current generated by the strong electric field buildup in storm clouds. The experiment was extremely hazardous, but the results were unmistakable. When he held his knuckles near the key, he could draw sparks from it. The next two people who tried to repeat this were killed.

In addition to wanting to prove that lightning was electricity, Franklin began to think about protecting people and buildings from lightning. Two years before the kite and key experiment, he had observed that a sharp iron needle would conduct electricity away from a charged metal sphere. He theorized that if an iron rod 8 or 10 feet long sharpened to a point was at the top of a building, "the electrical fire would, I think, be drawn out of a cloud silently, before it could come near enough to strike". Franklin's "lightning rods" were soon incorporated in all tall buildings and structures and eventually homes but the nature of lightning and electricity was still not clear.

Static And Animal Electricity

Amber is a yellowish, translucent resin and as early as 600 BC the Greeks were aware that it had a peculiar property. When rubbed with a piece of fur, amber developed the ability to attract small pieces of material such as feathers. For centuries this strange and inexplicable property was thought to be unique to amber but 2000 years later, William Gilbert proved that many other substances were electric (from *elektron*, the

Greek word for amber) and that there were two "electrical" effects. When rubbed with fur, amber acquired "resinous electricity"; when glass was rubbed with silk it gained "vitreous electricity." Articles with the same type of electricity would be repelled but the opposite kind would be attracted, similar to what could be demonstrated with like and unlike poles of magnets. Gilbert believed that friction created these types of electricity (his word for charge) and did not realize that an equal amount of opposite charge remained on the fur or silk.

In 1747, Franklin in the U.S. and William Watson in England independently proposed that all materials possessed a single kind of electrical "fluid" that can penetrate matter freely but that can be neither created nor destroyed. The action of rubbing merely transferred the fluid from one body to another, electrifying both. Franklin defined the fluid in the "vitreous" form as "positive" and a lack of fluid as "negative" electricity. He therefore believed that the direction of flow was from positive to negative, which is the opposite of what is now known to be true. A two-fluid theory was later developed proposing that samples of the same type were attracted to each other whereas opposite types would be repelled.

Because of an "accident", the 18th century anatomist Luigi Galvani started a chain of events that culminated in the development of the concept of voltage, the invention of the battery and the notion of "animal electricity". In 1780, one of his assistants noticed that a dissected frog leg twitched when he touched its nerve with a scalpel. Another assistant said that he had simultaneously seen a spark from a nearby charged electric generating machine.

Galvani repeated the experiment several times with the same results but found that the reaction was much stronger if his electric generating machine had been cranked up. When he held the scalpel by its bone handle so that he didn't touch any metal, nothing would happen. In addition, a leg placed in a container by itself would contract spontaneously if it were near a generating machine that was being charged. He reasoned that the electricity from the machine had caused the muscle contractions

but mistakenly thought that the effect was due to the transfer of a special fluid he referred to as "animal electricity".

He found that he could make a dead frog jump without the generator by holding it with a brass hook in one hand and lowering it until its feet rested on a silver box. Whenever he touched the box with a piece of metal in his other hand there was a pronounced twitch. If his assistant touched the box with the same metal, nothing happened; but if he repeated this while holding Galvani's hand, the frog jumped again. **Since there was no source of electricity, the best explanation was that muscles acted like little Leyden jars and that animal electricity only flowed when the circuit was completed.** Similar experiments in which animal legs were stimulated by contact with different types of metals led him to propose in 1791 that animal tissues generated electricity.

In another experiment he attached his frog leg dissection to an iron rod hung in the air and ran a wire from the leg to the earth. Whenever there was lightning, the leg would twitch long before he heard any thunder. If he stuck brass hooks in his preparations and hung them from an iron railing they all twitched together. Thus, lightning seemed to be the same kind of electricity he could produce with his generator. He later observed that even though his specimens were not attached to an iron rod to attract lightning they often twitched during storms without thunder or lightning. Even more confusing was that this sometimes happened on sunny and quiet days. He concluded that there must be some sort of invisible atmospheric electricity that acted like lightning — but where did it come from?

Batteries, Compasses, Magnets And Fields

Alessandro Volta, a professor at the University of Pavia, repeated Galvani's experiments and showed that he could make the frog leg twitch with the electricity stored in a Leyden jar as well as an electrostatic generator. He also confirmed that he could make a live frog leg twitch if it was in contact with two different metals that completed a circuit. He rejected Galvani's theory that this came from some electrical force that was stored in muscle and viewed

the frog leg as merely a detector of some external electrical force that could come from a generator, Leyden jar, or being in contact with different metals when a circuit was completed. To test his theory about the latter, Volta put some tin on the tip of his tongue and let it come in contact with a silver spoon that touched the back of his mouth. He immediately noted an unpleasant taste (similar to that experienced by people with fillings in their teeth that come in contact with a spoon made of another metal that also touches the tongue). In 1800, he succeeded in amplifying this effect by stacking alternating discs of zinc and copper separated by felt soaked in brine. This now provided a source of stored electricity that separated electrical charges by chemical rather than mechanical means. More powerful Voltaic cells were later called batteries, a term used to describe several Leyden jars connected so they could be discharged simultaneously. (Battery originally referred to inflicting harm as well as weapons that were discharged together, as in an artillery bombardment).

There also seemed to be some curious link between electricity and magnetism. Gilbert had observed that iron rods in buildings or windows that had been aligned in a north-south direction for decades became weakly magnetized, as did other iron rods struck by lightning. Since lodestones had been used as crude compasses for centuries to steer ships based on the position of certain stars, Gilbert theorized that our planet was a giant magnet with a north and south pole and that it rotated because it was magnetic. Most scientists believe this and it is uncanny that earth's magnetic axis is so close to its axis of rotation.

Gilbert also showed that magnetic forces were different than the electrostatic charges that developed when amber was rubbed with fur. At the time, permanent magnets were made by hammering lodestones into molten iron bars whose ends pointed north and south to take advantage of the earth's magnetic field. Like ends of magnets repelled each other and opposites were attracted similar to the behavior of different electrostatic charges.

In 1819, it was found that a compass needle was deflected if it was near a wire carrying electricity. It was later shown that this magnetic force appeared as a cylinder of magnetism around the wire and no such circular force had ever been observed. The discovery that all electrical currents created magnetic fields set off a flurry of experiments. Winding a coil of current carrying wire around an iron bar made a powerful electromagnet. When the current was reversed, so was the polarity of the magnet. **Faraday had originated the concept of a magnetic "field" with lines of force emanating out of each pole and believed that the energy was in the field, not the magnet.** He demonstrated how to produce a steady current by moving a magnet in and out of a wire coil whose ends were connected to different magnetic poles. He also showed how electrical energy could be converted into mechanical energy, which eventually led to the development of the motor.

Faraday's research was extended by Maxwell, whose four field equations mathematically explained all magnetic and electrical relationships and proposed the existence of electromagnetic waves able to travel great distances at the speed of light. He correctly predicted there would be other energies in this category and the rest of the electromagnetic spectrum eventually emerged, including x-ray, gamma ray, ultraviolet, infrared and all forms of light, radio, radar and television waves all traveling at the speed of light. This Unified Field Theory of a universe filled with fields that create forces that interact with one another also paved the way for Einstein's special theory of relativity, which established the equivalence of mass and energy.

Is Electricity The "Spark Of Life"?

The belief that powerful forces that influence the life or behavior of animate as well as inanimate objects permeated the universe was hardly new. It is firmly embedded in the ancient Oriental concept of *Qi* energy, with its antagonistic complementary components of *yin* and *yang* that flowed through the body via prescribed pathways, or meridians.

Aristotle also believed that a fifth element (*aether* or ether) permeated all of space and was the source of life. The medieval physician and alchemist Paracelsus called this pervasive, esoteric energizing force *archaeus*, from the Greek word for ancient or first.

A century and a half later, Isaac Newton hypothesized that the gravitational force he had discovered was mediated through an "ether" he described as "a most subtle spirit which pervades and lies hid in most gross bodies". He viewed this as a weightless, transparent, frictionless medium undetectable chemically or physically, that was everywhere. Maxwell also thought the ether was the medium that transmitted electromagnetic waves but this was disproved when the nature of light and structure of matter became clarified.

Paracelsus wrote, "Magnetism is the king of all secrets" and believed that *archaeus* was most influenced by the mysterious force found in magnets. Magnets could replenish *archaeus* energy to restore health and he used them to treat everything from epilepsy and diarrhea to various types of hemorrhage. By the middle of the 17th century, more powerful carbon-steel magnets had become available that heightened interest in their medical applications. The leading proponent was Mesmer, who proposed that an invisible magnetic fluid flowed through the atmosphere as well as all body fluids and that body components had poles similar to a magnet's. If these poles fell out of alignment with this universal magnetic flow it caused a variety of physical and emotional ills that could be corrected by the proper application of permanent magnets. He distinguished this "animal magnetism" from the magnetic forces found in iron and steel, which he referred to as "mineral magnetism".

Mesmer soon became legendary for his miraculous magnet therapy achievements throughout Europe, which included instantly curing the deaf and the blind. We now recognize that this was probably the result of hypnotism, which is still called mesmerism. Mesmer believed he could magnetize wood, paper and water by transferring his own powerful animal

magnetism. He later became convinced that magnets merely acted as conductors to facilitate the flow of his animal magnetism to patients. Some experienced a "magnetic crisis" similar to an electric shock during treatment, after which they were cured.

In imitation of electrical theory, Mesmer thought of magnetic fluid as being polarized, conductible and capable of being stored and discharged when needed. He subsequently developed the *baquet*, a tub that could accumulate and concentrate magnetic fluid much like a Leyden jar. The *baquet* enabled him to treat up to twenty patients at a time with each client connected to the fluid through contact with an iron rod. His fall was as meteoric as his rise following several spectacular failures that disproved his theories.

Lightning and electricity were also viewed as creating life, as illustrated by Michaelangelo's Sistine Chapel ceiling depiction of God's finger giving the spark of life to Adam. Medieval portrayals of creation or divine healing often showed mysterious rays emanating from heaven. Following Mary Shelley's description of how Dr. Frankenstein's creation was brought to life by attracting a bolt of lightning, all sorts of electrical resuscitation devices became popular during the early eighteenth century. Some of these occasionally worked when they acted as crude cardiac defibrillators or pacemakers in certain patients.

We now know that creating life by cloning also requires an electrical impulse to allow a nucleus to be inserted into an unfertilized ovum. Successive feeble millisecond jolts are then needed to trigger the process of cell division. Studies show that these induce the same surges of calcium ion and enzymatic activity that occur when a sperm penetrates an ovum to provide its own spark of life

Do Plants Have Nervous Systems?

George Lakhovsky proposed the theory that the basis of life was not matter but rather electrical vibrations that energized it in his 1925 *L'Origine de la Vie*. He wrote that **all living things emitted**

energy and cells were simply tiny oscillating circuits that sent and received high frequency signals, much like wireless radio sets that were popular at the time. Disease was essentially due to a disturbance in these oscillations resulting from the influence of more powerful vibrations from pathogens like bacteria and viruses. He reasoned that if an injured cell was able to have its disturbed oscillations corrected by somehow furnishing and fortifying it with the appropriate frequency, health could be restored.

He constructed a "radio-cellular-oscillator" emitting very short waves to do this and reported in his book that he had been able to destroy cherrystone size tumors in geraniums inoculated with cancer-causing bacteria. The healthy cells supervened because their natural oscillations had been enhanced, which was the opposite of cancer cells being killed by the external radiation used by radium specialists. He believed the energy responsible for oscillations was not made or stored in the cell but was somehow derived from cosmic radiation and that finding ways to harness this natural source would be preferable to his device.

He took one of several geraniums inoculated with cancer and surrounded it with a copper spiral whose ends were fixed in ebonite to concentrate this energy. After a few weeks, all the other geraniums had dried up and died but the one surrounded with the copper spiral was not only healthy but also twice as high as controls that had not been inoculated. He theorized that his copper spiral had somehow been able to filter out from all the numerous atmospheric electromagnetic waves, those frequencies that would enable the geranium cells to oscillate normally and more powerfully than their malignant neighbors. More than three years later, the copper surrounded geranium was still flourishing despite the cold winter, and had allegedly attained the remarkable height of four and one-half feet.

Around the same time Lakhovsky was conducting his experiments in Paris, a Texas team headed by E.J. Lund had

developed a method to measure electrical potentials in plants. They subsequently proved that plant cells produced electrical fields and also seemed to have internal currents that acted like the nervous systems of animals. **Lund demonstrated that plant growth was triggered by electrical fields rather than hormones or other chemicals as was widely believed.** These fields directed or transported growth-promoting substances to specific sites where growth was initiated by further stimulation. In *Bioelectric Fields and Growth*, he showed how **plant cell electrical patterns suddenly changed, almost 30 minutes before growth could be detected, due to the presence of plant chemicals**

Jagadis Chandra Bose in India had also demonstrated the characteristics of a nervous system by showing that if he shocked a mimosa stem with electricity or severe heat the nearest small branch collapsed within seconds followed by a folding of the leaves at its end. If he touched the tip of a leaf with a hot object it folded followed by the branchlet collapse. A galvanometer connected to these two sites confirmed an electrical discharge. Bose concluded that these mechanical reactions resulted from electrical stimulation much like muscle cells contract due to electrical impulses carried by nerves. When he touched the tip of the furthest leaf on a three-leaf branch, its leaflets gradually closed followed by closure of the other two leaves from the base up. **This is similar to the reflex arc that makes us immediately remove a finger from a hot stove.**

In Russia, Semion Kirlian was able to photograph an aura or energy field around living objects using high frequency electrical fields and electrodes instead of light and a camera. A leaf placed on unexposed film subjected to this process showed a surrounding symmetrical aura not detectable in regular photographs or by the naked eye. If Kirlian repeated the procedure after part of the periphery of the leaf had been cut off this same original energy field outline still remained and would often persist for surprisingly long periods of time.

Harold Saxton Burr's "L-Fields" Of Life

The energy fields of leaves from the same tree were similar but further studies suggested they could vary with health status. On one occasion, a Moscow official came to verify this strange energy and gave Kirlian two identical leaves to photograph. While there were superb pictures of energy flares from one, Kirlian was disappointed that the other showed only a faint outline despite repeated attempts. His visitor on the other hand was exuberant, as he explained that one leaf was from a healthy plant, while the other, although identical in appearance, came from a diseased specimen.

The possibility that disturbances in energy fields could detect disease had already been anticipated by Harold Saxton Burr, Professor of Anatomy at Yale. His research decades before had focused on the development of the nervous system and he was convinced that this was guided by energy fields similar to those Lund proposed for plants. Lund had gone on to show (in primitive organisms that can completely regenerate a severed head or tail), that applying a weak direct current could change the organism's polarity so that a head would form where a tail should have grown and vice versa. He also claimed to have influenced the development of frog eggs using magnetic fields as well as electric currents.

Stimulated by Lund's research, Burr found he could detect electrical fields around mammals, salamanders, worms and earlier life forms. He showed that the electrical characteristics of these fields changed during growth, regeneration or tumor formation. When he hooked his voltmeters to trees for long periods of time he found that their energy fields varied not only in response to changes in light and moisture, but also electrical storms and sunspots. Although he spent years designing sophisticated vacuum tube devices, his detectors and instruments were still not sensitive enough to accurately measure the minute changes in feeble electrical forces he believed might have important implications for health and life. Despite this, he made a number of important observations, many of which have recently been confirmed.



Burr's most important contribution was the proposal that all living things - from men to mice and trees to seeds - were molded and controlled by "electro-dynamic fields" that could be mapped and measured. These "fields of life" or "L-fields" were the basic blueprints of all life. Although invisible and intangible, they were analogous to magnetic fields that cause iron filings scattered on a card held over a magnet to arrange themselves in the magnet's force field pattern at both poles. If the filings are discarded and new ones are scattered on the card, they will immediately assume this same symmetrical pattern.

Burr thought that something similar happens in the body. Although cells and molecules were constantly being destroyed and rebuilt, they inevitably arranged themselves in the same pattern as the old ones. The L-fields acted as a matrix or mould to preserve the shape or arrangement of any material poured into it, no matter how often this changed. Burr wrote, "When a cook looks at a jelly mould, she knows the shape of the jelly she will turn out of it. In much the same way, inspection with instruments of an L-field in its initial stage can reveal the future 'shape' or arrangement of the materials it will mould. When the L-field in a frog's egg, for instance, is examined electrically, it is possible to show the future location of the frog's nervous system because the frog's L-field is the matrix that determines the form which will develop from the egg." Could L-fields be used to evaluate health in humans?

Can Bioelectromagnetic Energies Be Used To Diagnose And Treat Different Disorders?

As Burr explained in his 1972 *Blueprint For Immortality*, just as a cook who uses a battered mould expects to find some dents or bulges in the jelly, an L-field with distorted voltage patterns might indicate the presence of abnormalities well in advance of any signs or symptoms. He reasoned that if healthy cells had an L-field matrix that programmed normal tissue growth, cancer cells with atypical rapid growth patterns would have quite different field characteristics. In 1936, he began studies on a strain of mice that spontaneously developed mammary tumors and found large voltage changes in electrodes placed on the chest 10 days to two weeks before the tumors could be otherwise detected. In another strain prone to develop cancer following the implantation of malignant tissue he found that voltage gradients started to increase within 24-48 hours after the procedure and rose steadily to a maximum of 5 millivolts around the eleventh day after which they began to decline. This increase corresponded with the period of most rapid growth of the cancer.

Burr showed that changes in electrical fields could detect precisely when ovulation took place in animals and that in humans, some women ovulated throughout the menstrual cycle, some ovulated without menses and some had menses without ovulation. One of his patients who had tried unsuccessfully to conceive for years was studied daily for weeks until ovulation could be detected, following which she promptly became pregnant. Louis Langman confirmed the value of this technique and also extended

Burr's cancer studies in over 1000 patients admitted to the Gynecology Service at New York's Bellevue Hospital. By measuring changes in potential between one cervical electrode and another placed on the abdomen, he found that almost 99% of 75 patients with documented cancer showed electro-negativity of the cervix. In the remaining 353 patients presumably admitted for a non-malignant disorder, the cervix was significantly positive with respect to the abdomen in 82%. Electronegativity in the remainder was due to some other benign cause, such as ovulation. Another larger study of 840 consecutive admissions confirmed these results in patients with various malignancies of the cervix, body of the uterus, ovary or vagina.

Recent research supports Burr's theories. **Skin surface potentials can now be used to differentiate between malignant and benign breast lesions and the FDA recently approved a cancer detection device based on differences in electrical impedance in malignant tissues.** AIS Congresses have demonstrated how Sodi Pallares' electromagnetic field therapy and Nordenström's weak direct current application to metastatic lung lesions have resulted in amazing regressions if not cures in patients with terminal malignancies. The availability of more sensitive devices like SQUID and magnetoencephalography have also confirmed Burr's belief that energy fields can reflect emotional as well as physical health. This has important implications for diagnosing and treating stress-related disorders and will be discussed in a subsequent Newsletter, - so stay tuned!

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