Man taps nature's invisible web of force

MAGNETISM!

by Gaston Burridge

SUPPOSE WE ARE stranded on a desert island. We've no clothes save our pants and shirts — no belts with metal buckles, no shoes with metal nails, no knife, no keys, no hard money. We possess no metal of any kind, but have been told that if we can find "north," we will be freed — otherwise, we must remain on the island.

We try locating north by the sun but that isn't accurate enough. As we search our island, we notice a rusting strip of iron. If only it is a magnet; and we can find out merely by suspending the iron by its middle on nothing more than a long hair from a head or a thread from a shirt tail. If a magnet, the ends will always swing in the same direction, and the same spot *in* that direction. Those points, keeping the location of the sun and the time of day in mind, will be north and south. Are we lost if the strip of iron is not a magnet? Not necessarily. We can make one by gently honing the iron on the stone, always in the same direction, not back and forth on the rock, being careful not to strike the iron and stone together. We will have plenty of time, but will we have the patience to indulge nature's incessant interest in the "pair"? All magnets are either attracted to, or repelled by other magnets, depending how their poles approach each other. Like poles repel, unlike poles attract.

The Earth itself is a huge magnet. Between its north and south poles, playing all around the earth between them, and extending many, many miles into space, is an invisible web of magnetic tentacles, or a "field of magnetic force." All magnets on Earth, if free, attempt to "line up" their own fields of forces with the Earth's.

We don't know what magnetism is. The best definition is a description of what its actions and reactions are with or towards other known things.

Natural magnets, a form of iron ore or "loadstone," was first discovered probably in Magnesia, Asia Minor. No one knows when. Lucretius, writing in the early Christian era, makes scant mention of magnets, but about 1200 A.D., we find statements that loadstones always seek the same direction if free to do so. An early complete history of magnetism called *De Magnete,* was written by William Gilbert in the middle 1500's.

The ordinary eye can't see a magnet's field force pattern unless it is outlined with iron dust on a thin glass plate or a piece of cardboard. Even so, the result is only a two-dimensional picture of a field which is at least three dimensional. To see the pattern, place a bar magnet, its poles skyward, beneath the cardboard and sift iron dust on top. Immediately, the dust pencils lines of force as interesting curve patterns interlace.

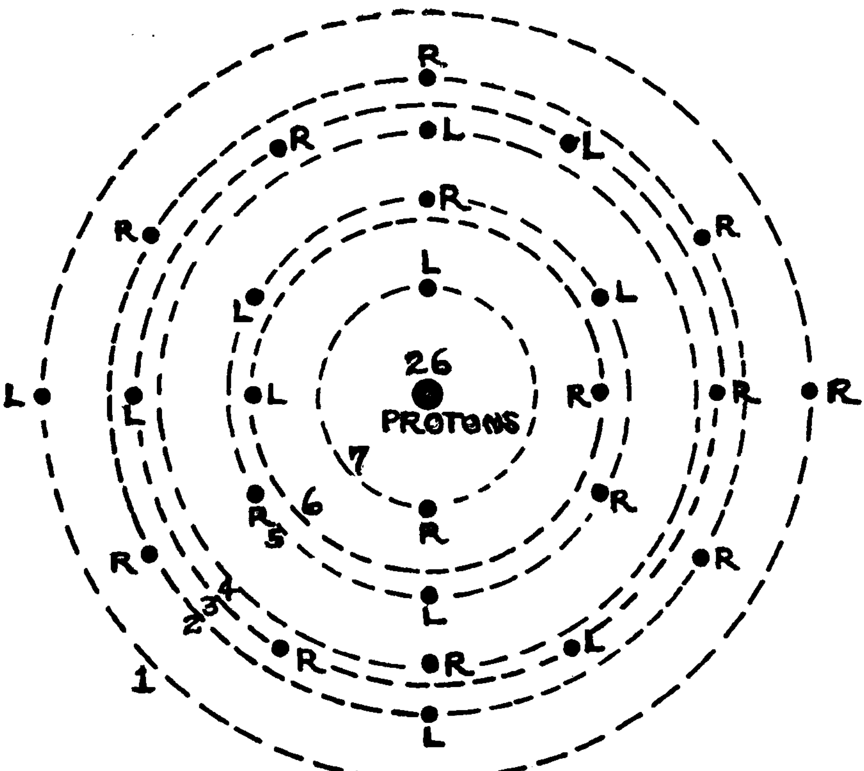
We cannot feel these lines of force. They produce no sensation on our tongue, cheek or fingers. Our ears hear nothing of their passing. Physically, we seem dead to magnetic action. But indirect evidence of magnetism's existence is so enormous not even the most skeptical will deny *something* is there.

Now, though ordinary folk cannot *see* magnetic force patterns, if Baron Karl Von Reichenbach (1788-1869) a German natural philosopher and scientist is to be believed, his experiments indicate some humans called "sensitives" can see them.

Few of Reichenbach's colleagues agreed with him, nor would any of them try experiments he suggested; neither have scientists since. A man of wealth and position, Reichenbach, today, would be considered a chemical engineer. He discovered creosote and paraffin, controlled important agricultural and chemical producing properties, was a leading meteor authority, as well as a big steel producer. He neither needed nor wanted publicity, cheap or otherwise.

But, through years of research, Reichenbach had collected more than 100 "sensitives" who described the magnetic lines as "leaping flames" rising to differing heights above a magnet's poles, depending on the magnet's strength and size. The "light" from the flames

Schematic iron atom shows why iron is magnetic. Circling center core of 26 protons are 26 (black dots) electrons in seven separate orbit-shells. This atom should be thought of as a sphere rather than a circle. The seven electron orbits are not in a plane, but the electrons in each orbit do spin in the same plane. The dotted lines show relative size of orbit-shells. Electrons spin on their own axes as well as around the protons. Also, electrons spin in either of two directions, "L" (for left) and "R" (for right). Each electron is a tiny magnet. In all shells except number two (second from outside) R and L spins are equal and counterbalance themselves, hence cancel out their magnetic effect. But in number two orbit-shell we find five rights and only one left, which leaves a net magnetic effect.



flickered from lavender to orange, depending upon which pole was exposed, and whether singly or together, how strong the magnet was and how sensitive the viewer.

Here lies a virtually untrammeled field of discovery. Reichenbach's experiments ought to be resumed with today's methods of wave detection and registry.

If we thrust a white-hot poker into a block of ice, the ice "boils." If we attempt to punch a bar magnet into the ice, nothing happens, but if we thrust it into a block of dry ice (solidified carbon dioxide gas), then the dry ice "boils." We call the poker "hot" — so does the water. The bar magnet is "cold" to our touch, and to the water-ice, but is "hot" to the solid carbon dioxide.

Any material attracted by another's magnetic lines of force, as iron attracts nickel, is a paramagnetic material. Some materials push, or are pushed away. Bismuth, a whitish-gray metal, is the most diamagnetic substance known.

Many materials of Earth are neutral magnetically. Force an electric current through them, however, and they will produce about themselves the electromagnetic field upon which today's entire electrical power system is built. The field, in turn, produces the electromagnetic waves which are the keystone of our communications system.

Recent reports from Carnegie Institute in Washington suggest the earth's magnetic poles may have been reversed. Upon studying magnetism in Appalachian Mountain rock, Dr. Horace Babcock found indications that perhaps 210 million years ago, earth's "north" may have been "south" and vice versa.

Dr. Babcock, after 11 years of scanning the skies at California's Mt. Wilson and Palomar Observatories, also has determined that 86 stars probably have magnetic fields, and 65 others are "suspect." Our sun, and our nearest star, has a magnetic field which reverses itself. Why, is not known.

COSMIC RAYS are mysterious "parts" of atoms "loose" in outer space. Vast numbers bombard Earth every second. Some have tremendous energy, striking the Earth with billions of electron volts, but are so small scientists have considerable trouble detecting and recording them. Some astrophysicists think such extra high speed cosmic rays get accelerated in huge magnetic fields of force located in space — powerful natural cyclons we cannot readily comprehend.

What makes a magnet? What endows a piece of iron with the properties we call a magnetic field? Science says magnetism is the atomic quality that stems from the spin of electrons in material. Each spinning electron is a tiny, permanent magnet. Electrons tend to pair up, each electron spinning in opposite directions, but the more electrons we can arrange to spin in the same direction, the better magnet we will have.

What *is* an electron? According to nuclear theory, matter is made up, basically, of atoms—the smallest ingredient taking part in a chemical reaction. This page's thickness is made up of more than 400,000 atoms piled one on top the other. Nitrogen, the smallest, is about 1/254 millionth of an inch in diameter. Protons and neutrons form the core of atoms. Electrons circle this core. An electron's mass is calculated as 1/1840th of the proton's mass. 32,970,000,000,000,000,000,000,000,000 electrons weigh one ounce. Considerable space exists between the parts of all atoms. Some calculations indicate that if a cubic inch of lead were compressed until the human eye could no longer see it, still not all the atomic parts of all its atoms would be touching one another.

Electrons always maintain their proper orbit and, in the nearest approach we know to perpetual motion, spin forever, apparently. Why, is a secret we must discover.

In the rings of the iron atom (see illustration) the electron's position is divided equally around each diameter, the electrons spinning singly but in unison, though not grouped closely together. Accepted nuclear theory insists this infinitely tiny atom is a spherical figure, not a circular, disc-like one.

MAGNETIC FORCE is measured in *gauss* (rhymes with louse), named for Karl F. Gauss (1777-1855) a German scientist who did early research in magnetism.

Magnetic forces can be used to treat mankind through healing chemicals called alpha iron crystals. Capable of passing through the body's tiniest capillaries, the crystals carry into the body isotope radiations of selected radioactive elements. Then, through use of magnetic force, the elements are directed to congregate upon the spot needing treatment. This therapy shows results quickly, often within ten minutes, and research is continuing.

Westinghouse Research Laboratories have developed a new kind of steel alloy (made of elements of silicon and iron) which directs magnetism "around a corner." The ordinary steel used for core materials in motors, generators, and transformers can be magnetized in only two directions — back and forth along the direction in which the material was first rolled. The new steel allows other directional magnetization.

A new magnetic device, smaller than a common pin, may allow future electronic computers to "think" or recall" infinitely better than present ones. The heart of the device is a new kind of magnetic glass rod which serves as a switch and an information storage bin. The rod can switch up electric currents to speeds of 250 million a second: Five thousand such rods, working simultaneously, require only as much power as a 100-watt lamp.

Ceramics, surprisingly, are making very good magnets. Weight for weight, they have two to three times the power of iron magnets and, also, retain their magnetism at high temperatures better than the iron ones. Boeing Aircraft Company makes the new magnets by mixing with ceramic materials two metallic oxides, such as iron and barium. While the ceramics are being cooked under heat and pressure, a powerful magnetic field is introduced to align the particles. This produces better, lighter magnets.

THESE ARE but midget uses of magnetic force. A giant use of this phenomenon which, remember, we cannot see, feel, taste or hear is converting it to "tubes" or "bottles" to contain millions of degrees of heat in a new process of atomic energy production called "fusion of the hydrogen atom."

To build a steady reaction-flow to produce power, the transmutation of a kind of hydrogen called *deterium* requires temperatures approaching 100 million degrees. Commercially, this method will create tremendous amounts of power. The basic fuel derives from the seven seas. Of course, any substance, unless bottled, vaporizes long before its temperature reaches 100 million degrees. For a container, research labs have produced electromagnetic fields up to 500,000 gauss. Not more than a tenth of this amount appears necessary to produce a satisfactory bottle.

As man's knowledge ever expands, the distance shortens between that which *is* and that which *is not.*

KELP: Abundant Sea Harvest

by Novella Lawrence

NORTH of Point Loma, a high strip of land jutting out into the Pacific, and separating San Diego Bay from the Sea, lie the Great Kelp beds, extending beyond Santa Barbara, and out among the channel islands. In full growth, the beds furnish most of the algin used in this country.

The many lush vines and fronds that make up these beds rise from shelves and reefs 150 feet down. Each plant is buoyed to the surface by fragile, tubular spindle shaped air bladders. On the surface the plants spread out another 30 feet, matting and entwining to form huge gardens, red and brown and green. Each garden extends for miles.

Kelp's strong stems and rootlike holdfasts can resist the ordinary force and pull of waves and tide. But, heavy storms break off many of the vines, and they float to new locations where their reproductive material starts new beds. Birds also carry the spores in their feathers and digestive tract.

When the water is clear, one can look down and see the rhizones from which the vines sprout, their roots clinging to rocky surface, and covering an area, sometimes, as large as a bushel basket. Little Sea creatures swarm under the kelp beds and attach themselves to the vines making the beds a feeding ground for schools of fish.

Kelp has many varieties, being kin to the seaweed family. The most abundant, most interesting and most productive of algin (a ton of kelp produces 44 pounds of algin), used in the manufacture of more than 150 different products, is the *Macrosystis* that grows along the Pacific Coast.

Seaweed's high mineral and vitamin content has made it a food eaten since the days of Confucius. The Japanese nib-