

## The ups and downs of magnetic cycles

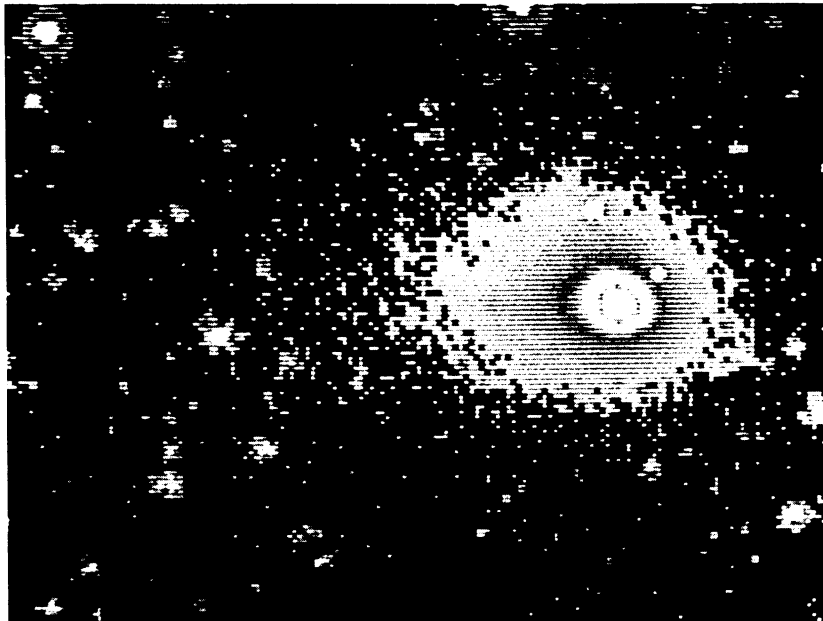
On the average, the earth's magnetic field does an about-face, completely flipping direction, every 650,000 years. But the actual frequency of geomagnetic reversals can vary considerably. One exciting development in the last few years was the finding by a number of researchers that the reversal frequency successively increases and decreases every 30 million years [Myr] or so. This is tantalizing because it bolsters the increasingly popular but hotly debated view that the earth and the life it supports are subjected to dramatic changes with clocklike regularity (SN: 10/1/83, p. 212; 5/25/85, p. 324).

The results of a new paper in the Oct. 3 NATURE, however, should be sobering to those who have subscribed to the 30 Myr geomagnetic cycle. While the paper, by Timothy M. Lutz, a geologist at the University of Pennsylvania in Philadelphia, does not prove that the geomagnetic record is *not* periodic, it does show that a statistical technique used to find this 30 Myr cycle is flawed. The paper also suggests that the periodicities claimed in other geologic records, such as surges of volcanism, impact cratering and biological extinctions, be carefully reexamined.

In his paper, Lutz looks at the statistical procedure used by David M. Raup at the University of Chicago in a NATURE paper published earlier this year. Lutz concludes that the 30 Myr cycle found by Raup was not a real periodicity but rather a subharmonic of a dip in the number of reversals 150 Myr ago which has long been recognized to occur in the 165-Myr-old record. A subharmonic means that one can multiply an integer (in this case, five) times 30 Myr to get 150 Myr. If, however, the time to this dip were shortened from 150 Myr, the 30 Myr cycle would no longer show up as a subharmonic; it would only be evident if it represented a real periodicity. This is exactly the test Lutz applied; he truncated the record by eliminating the most recent reversals so that the time to the dip was shortened. Not only did the 30 Myr cycle disappear, but after his analysis Lutz found no evidence for any other periodicities either.

In the "News and Views" section of the same issue of NATURE, Raup graciously acknowledges his error. Lutz "has shown by an elegant experiment that the 30 Myr signal is predictably sensitive to the length of the time series," he writes. Both he and Lutz also urge that this truncation test be applied to past statistical studies of other geologic phenomena. "Two of the three studies of [biological] extinction used essentially the same statistical techniques that I used with the magnetic data but, as Lutz points out, the extinction and magnetic data are different," Raup continues. "I am happy to report that Lutz's trunca-

## Comet Halley begins to show its tail



Comet Halley is finally showing signs of its developing tail. The fuzzy "coma" produced as the sun's heat frees dust and ice particles from the comet's frozen nucleus has been visible for months, but the viewing angle from earth has made the tail difficult to identify. The comet has been under scrutiny since it was spotted three years ago on the way to its first rendezvous with the sun since 1910 (SN: 10/30/82, p. 277). This photo was taken on Sept. 25 by James Gibson of Jet Propulsion Laboratory in Pasadena, Calif., using the 60-inch telescope at Palomar Observatory and a red filter to enhance light reflected from the tail's dust.

Caltech

tion procedure has been applied to the analysis of the extinction data with no effect on its results."

In his recent paper, Lutz also presents a new statistical approach for periodicity hunting, which he believes is conceptually simpler than other methods and which burns up less computer time for moderate-size data sets. Still, he argues that this

and the other techniques are simplistic, partially because there is so little geomagnetic data available. Moreover, most of the statistical work in geology, econometrics and other fields has not focused on looking for periodicities. "If we had a really good statistician to work on this," Lutz says, "he might come up with some new ideas." —S. Weisburd

## Hyperactivity: Will it stay or go?

Hyperactive children, it appears, are not always — or even usually — on a one-way street to behavior problems later in life. About two-thirds of a large group of boys diagnosed as hyperactive in childhood have shed all or most of the problems associated with the disorder as they moved into adolescence, according to researchers at the Long Island Jewish-Hillside Medical Center in Glen Oaks, N.Y.

But the rest of the boys in the group still display the symptoms of childhood hyperactivity, as well as a surplus of aggressive and criminal behaviors and drug abuse, report Rachel Gittelman and her colleagues in the October ARCHIVES OF GENERAL PSYCHIATRY.

This suggests that there is a subgroup of "pure" hyperactive children who are most likely to engage in delinquent and antisocial behavior later in life, writes psychiatrist Dennis P. Cantwell of the University of

California at Los Angeles in an accompanying editorial. It is unclear, he adds, whether the hyperactivity and other symptoms in these adolescents will persist into adulthood.

The nature of childhood hyperactivity — an overwhelmingly male phenomenon — has been studied and debated for several decades, but few researchers have diagnosed the disorder in a group of children and followed the same youngsters into adolescence. Defining and measuring hyperactivity, or "attention deficit disorder with hyperactivity," as it is now called, has always proved troublesome. Three categories of behavioral signs are sought: inattention (such as difficulty concentrating on or finishing school projects), impulsivity (such as acting before thinking about the consequences of behavior and constantly shifting from one activity to another) and excessive physical activity

(including difficulty staying seated and sitting still without fidgeting).

In extensive interviews with 101 males, ages 16 to 23, who had been diagnosed as hyperactive in childhood, and in interviews with their parents, the researchers found that all three behavioral markers still characterize 31 of the boys. This is striking, they say, because it is often assumed that problems with attention remain, while impulsive behavior and physical overactivity diminish or disappear during adolescence. The scientists also tracked the progress of 100 nonhyperactive boys, only three of whom displayed all the signs of hyperactivity during their teenage years.

The 31 adolescents with "pure" hyperactivity also engaged in significantly more "antisocial behavior," say the investigators. This includes school truancy and expulsion, vandalism, fighting, thefts and criminal arrests. Alcohol and drug use also were far more common among these boys.

The good news, they note, is that behavioral problems markedly dropped during adolescence for the majority of once-hyperactive boys. Researchers involved in two other ongoing, long-term studies of hyperactive boys are coming up with similar findings.

Gabrielle Weiss of McGill University in Montreal and her co-workers say that less than half of a group of 63 men aged 21 to 33, who as children were diagnosed as hyperactive, continue to display at least one of the three symptoms of hyperactivity. Mild to severe "antisocial behavior" also was observed among these individuals, they report in the March *JOURNAL OF THE AMERICAN ACADEMY OF CHILD PSYCHIATRY*.

In 1982, James H. Satterfield and his colleagues at the National Center for Hyperactive Children in Encino, Calif., used official arrest records to confirm that 110 teenage boys diagnosed as hyperactive in childhood were arrested far more often than 88 nonhyperactive adolescents. In a further comparison, they found that hyperactive youths arrested more than once for serious offenses had, in childhood, normal brain activity on an electroencephalogram (EEG) and other tests of cortical function; hyperactive boys with no later arrests showed abnormal brain function on the same tests.

Although EEG data cover only a small portion of brain activity, cautions Satterfield, lack of abnormality still predicted later delinquency better than IQ, economic status or psychological tests. This flies in the face of traditional assumptions that brain function abnormalities lead to more severe behavior problems, he says. Explanations of the surprising finding are "all speculation" at this point, adds Satterfield. He is now putting together an extensive long-term study of hyperactives' brain function that will include brain imaging data.

—B. Bower

## Nobels

### Medicine: Brown, Goldstein honored

This year's Nobel Prize in physiology or medicine goes to Michael S. Brown and Joseph L. Goldstein of the University of Texas Health Science Center at Dallas for their elucidation of a key step in cholesterol metabolism. The two researchers "revolutionized our knowledge about the regulation of cholesterol metabolism and the treatment of diseases caused by abnormally elevated cholesterol levels in the blood," said the Nobel Assembly of the Karolinska Institute in Stockholm, Sweden.

The body requires cholesterol for building cell membranes, certain steroid hormones and bile acids. Cells get the substance from ingested cholesterol that has been absorbed by the blood, and by manufacturing it themselves. In 1973 Brown and Goldstein discovered a protein on the surface of cells that grabs a cholesterol-carrying particle called low-density lipoprotein (LDL) from the blood and brings it into the cell where it can be used.

Finding the LDL receptor was the initial step in a cascade of research. Brown and Goldstein went on to discover that when cells have enough cholesterol they temporarily stop manufacturing the receptors. The high cholesterol levels left circulating in the blood wind up clogging arteries and causing potentially fatal heart and blood vessel diseases.

Complete absence of the receptors provided the explanation for why some children—about one in a million—get severe atherosclerosis at an early age, some of them having heart attacks at the age of 5 or 6. The disease, called familial hypercholesterolemia, "is a vivid experiment of nature," Brown and Goldstein wrote in the November 1984 *SCIENTIFIC AMERICAN*. "It demonstrates unequivocally the causal relation between an elevated circulating LDL level and atherosclerosis."

One such child, 8-year-old Stormie Jones of Dallas, received the first human heart/liver transplant last year after suffering a heart attack and having two bypass operations. The new liver has given her an organ capable of producing the much-needed receptors. Her cholesterol levels have dropped dramatically, and she is doing well.

With the exclusion of a few ethnic groups, about one in every 500 people are capable of manufacturing only low levels of the receptor. These people have plasma LDL levels twice the normal level—even before they are born—and begin to have heart attacks at the age of 35. People with normal ability to make LDL receptors are also at risk of atherosclerosis, Brown and Goldstein say, because eating a diet high in cholesterol and fatty acids suppresses receptor synthesis.

The two researchers have also looked



Brown



Goldstein

Wide World

closely at the basic genetics behind the LDL receptor. Recently, they and co-workers reported that the gene coding for the receptor is built of parts very similar to gene segments coding for unrelated proteins (SN: 5/18/85, p. 309). The finding is the first evidence supporting a theory that gene segments with no apparent function actually allow "meaningful" genetic segments to combine and form new genes.

Brown and Goldstein, in their *SCIENTIFIC AMERICAN* article, estimated that "more than half of all people in Western industrialized societies, including the United States, have a level of circulating LDL that puts them at high risk for developing atherosclerosis." They are working with others on combining a cholesterol-reducing resin (SN: 1/2/84, p. 38) with a drug called mevinolin that inhibits a key step in cholesterol synthesis. The combination lowers blood LDL levels and increases the number of LDL receptors on cells. If drugs can be found to safely prevent suppression of the receptors, they say, "it may one day be possible for many people to have their steak and live to enjoy it too."

—J. Silberner

## Nobels

### Peace: Two from the heart

The procedure undertaken five years ago by cardiologists Bernard Lown and Evgueni I. Chazov was straightforward: Clog the arteries of support for nuclear weaponry until the heart and soul of the atomic arms race stops beating. And though the physicians' organization they founded, the Boston-based International Physicians for the Prevention of Nuclear War, has not nearly completed its operation, its efforts thus far have been rewarded with the 1985 Nobel Peace Prize, announced last week in Oslo, Norway.

The organization, founded jointly by Chazov, of the USSR, who has been the personal physician of several Soviet leaders, and Lown of the Harvard School of Public Health, has swelled in membership to 135,000 people in 41 countries. The Norwegian Nobel Committee said the group has "performed a considerable service to mankind by spreading authoritative information and by creating an awareness of the catastrophic consequences of atomic warfare." The committee said it will invite both Lown and Chazov to receive the prize, which carries an award of about \$225,000. □