

active juvenile rheumatoid arthritis, another suspected autoimmune disease, have antibodies directed against suppressor T cells (SN: 11/18/78, p. 342). Now Ellis L. Reinherz of the Sidney Farber Cancer Institute in Boston and his team report in the Nov. 8 NEW ENGLAND JOURNAL OF MEDICINE on an anemic patient who had antibodies directed against her red blood cells plus a lack of suppressor T cells. In her case, a lack of suppressor T's may have let antibodies form against red blood cells.

The complex interaction between suppressor T cells and autoantibodies in various autoimmune diseases has not been fully explained, but the role of suppressor T cells in such disorders has led to a possible therapy for such diseases. Thoracic duct drainage of disordered T cells, for instance, has been shown to decrease disease activity in both lupus patients and in patients with adult rheumatoid arthritis (another suspected autoimmune disease). But such drainage is a major surgical procedure that requires prolonged hospitalization. Now S. Slavin of the Hadassah-Hebrew University in Jerusalem reports on irradiation of autoimmune patients' lymphoid tissues in an attempt to wipe out disordered T cells. He tested the idea on rats with autoimmune polyarthritis, and it brought about disease remission. Then he tested it on a small group of mice with experimental lupus, and as he reports in the October PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, it reduced their disease and increased their survival significantly compared with control mice. So "total lymphoid irradiation should be further investigated as a new approach for immunoregulation of autoimmune disorders," Slavin concludes. □

## First commercial SNG

Approval to build the nation's first commercial-scale coal-gasification plant by a consortium of five interstate gas-pipeline companies was given November 15 by the nation's gas rate setting body, the Federal Energy Regulatory Commission. Using a relatively costly process, the plant would manufacture 125,000 cubic feet of synthetic natural gas per day from lignite and water.

Key among terms of the 150-page FERC order was an agreement to let the pipeline companies average in the price of the synthetic gas — expected to cost between \$5.56 and \$8.62 per thousand cubic feet (mcf) — with the price charged their customers for natural gas, now about \$1.20 per mcf. Roughly one-third of the nation's gas customers would be affected.

Plans call for constructing the plant — now estimated to cost more than \$1 billion — beside lignite strip mines in Beulah, N.D. The consortium has been planning and seeking regulatory approval for the plant for more than five years. □

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## A seven-foot 'hole-in-one'

About 1.5 million years ago, someone strolled among the hippopotamuses and large birds that populated the northeast shore of what is now Lake Turkana in northern Kenya. Such a scene was probably not uncommon at that time in history, but what makes this particular walk so significant is that it was etched permanently in the muddy, lakeside soil.

In what researchers are calling an archaeological first, seven of the footprints were accidentally discovered during the digging of a geological trench. And if the prints were indeed made by *Homo erectus*, as scientists believe, then they would constitute the oldest footprints yet found of a creature in the same genus as man. The creature may also have been *Australopithecus africanus* — a creature more indirectly related to human beings — "but the case is stronger for *Homo erectus* because its fossil bones are preserved in

nearby strata, but not the bones of *Australopithecus*," says Anna K. Behrensmeyer, co-leader of the expedition and currently at Yale University.

The footprints were uncovered in a bed of volcanic rock dated at 1.5 million years. The research team, which included co-leader Leo F. LaPorte of the University of California at Santa Cruz (where Behrensmeyer is also affiliated) also found fossil footprints of hippos and heron-like birds in the same area. All the prints were made in mud, which then hardened.

Behrensmeyer says the human-like prints, all made by the same individual, were about 10.5 inches long and 3.5 inches wide. She estimated the person was between 5 and 5.5 feet tall and weighed about 120 pounds. Glynn L. Isaac, project supervisor from UC-Berkeley, characterized the find as "a paleo-anthropological hole-in-one." □

*Footprints, believed to have been made by Homo erectus, were found next to larger prints of ancient hippopotamuses along the shore of Lake Turkana in Kenya. Sharp-edged tools, characteristic of those found at other Homo erectus sites, were uncovered in nearby sedimentary beds by the research team, which was funded by the National Science Foundation and was part of a larger project of the National Museum of Kenya. A 600-pound cast of the footprints has been made at the museum in Nairobi.*



Wide World Photo

## Monkey see, monkey say

Distinguishing among the many varieties of African eagles is difficult for the human eye, but routine for the eyes of vervet monkeys. They give alarm calls only when they sight members of the two eagle species that prey on vervet young. This sophisticated appraisal of the surroundings goes beyond simple instinct, argues Peter Marler of Rockefeller University. He describes work by colleagues Dorothy Cheney and Robert Seyfarth indicating that, as a young vervet monkey matures, it sharpens its perceptions and responses to its environment.

The vervet monkey uses three different alarm calls in response to three classes of

predators, and each call evokes a particular behavior in other monkeys. Tape recordings of the calls, played when no predator is in sight, also trigger the characteristic behavior. A "snake call" for instance, makes the monkeys jump up on their hind legs and scrutinize the grass; an "eagle call" makes them rush for dense cover and a "leopard call" sends them scurrying up into the trees.

The calls of monkeys seem to be symbols for objects, according to a convention understood by other members of the species. Recent experiments in which scientists played recorded calls to monkeys in a laboratory showed that two species of

monkeys may react to the same sound quite differently.

The vervets are not absolutely consistent about what intruder triggers an alarm call, so the scientists in the field kept track of the "mistakes." They found that the adult monkeys seldom err, juveniles err more frequently and infants err most frequently of all. The juveniles, for instance, give the eagle call on occasion at the sight of an innocuous bird such as a stork or a spoonbill. Infants carry their caution even further; one gave the eagle alarm at the sight of an airborne leaf.

"Although they make mistakes, there is an order to the errors," Marler says. The young monkeys, for instance, may give an eagle call at the sight of a pigeon, but they never mistakenly give the eagle call in response to a leopard. "It's as though they have a generally preordained mechanism, which specifies that the eagle alarm call should be given to something that may be defined as 'moving up above' of a certain size and with a certain trajectory," he proposes. Initially for the young monkey, many stimuli satisfy that requirement. Gradually, however, the animals' perception becomes more discriminating, like children sharpening their semantic sense, Marler says.

Marler suggests that these animal studies offer a glimmer of hope for experimental elucidation of the process by which a child brings "innate knowledge" to the task of developing understanding. "We blind ourselves to the prospect of new discoveries if we insist on treating animals as though they were automata. The knowledge they have of companions and their surroundings is probably as intricate and complex as our own, though with an emphasis that is unique to each species," Marler says. In other work Marler observes among songbirds a complex mix of innate tendency, imitation, modification and invention (see p. 362). In discussion at the recent meeting in Atlanta of the Society for Neuroscience, James L. Gould of Princeton University challenged the idea that complexity of a behavior necessarily implies cognition. He says that what appears to be animal awareness and intentions may just be preordained, preprogrammed learning routines combined with scientists' ignorance of how complicated such programs can get. His work with bees (SN:11/17/79, p. 342) indicates that apparently complicated feats of communication can be described by simple rules that could be genetically determined.

Donald R. Griffin of Rockefeller University emphasizes the importance of gathering information about whether nonhuman animals have intentions or are aware of themselves in relation to their surroundings. "A cognitive ethology can thus hope to illuminate the fundamental dimensions of those attributes we loosely call thinking and which, in their most versatile manifestations, are the sources of our most profound satisfactions." □

## Fluoride: Prevents caries longer

Tooth decay may not be the most serious or painful health problem in the United States, but is probably the most common and certainly the most enduring. Most — but not all — dental researchers consider fluoridation the most effective means of preventing dental caries (SN: 9/1/79, p. 152). Now, in the most recent follow-up of a clinical study started in 1969, it looks as if fluoride's protective effects continue after treatment with fluoride tablets ceases. A year and a half after treatments were discontinued, the children in the Wayne County, North Carolina Public Health Service study who had received one or two fluoride tablets daily for six school years had fewer dental caries than those who had received a flavored placebo tablet. Both during and after treatment, the fluoride group had between 32 and 35 percent fewer caries than the control group.

The study — conducted by William S. Driscoll, Stanley B. Heifetz and Janet A. Brunelle of the National Institute of Dental

## Dean justifies psychic research

Many respectable scientists, from Einstein on down, have speculated on the credibility of so-called "psychic" phenomena and on how they can be studied scientifically. Generally such efforts to legitimize this study have been thwarted by the obvious presence of charlatans and fools among reputed psychics and by open hostility from the scientific community at large. Perhaps worst of all, few new theoretical or experimental approaches to the subject have been generated.

Now a fresh set of "psi" experiments involving sophisticated technology has been designed by Princeton University's dean of Engineering and Applied Science, Robert G. Jahn, and his co-workers. Although Jahn is not yet ready to publish any conclusive results, he has offered some thoughts on a theoretical approach to psychic phenomena and has concluded that "once the overburden of illegitimate activity and irresponsible criticism is removed, there is sufficient residue of valid evidence to justify continued research."

Jahn, best known for his pioneering work with plasma discharges, summarized his two-year experience with psychic research during a recent science writers' meeting in Palo Alto.

Traditional psychic research has amounted to little more than the collection of anecdotes of spontaneous events, which tend to be spectacular but unverifiable, or of rather subjective laboratory

Research — started in 1969 when the 1,064 children were in first or second grade. After the original check-up, they were re-examined at intervals of 30 months, 55 months and six years. Following the six-year check-up, the fluoride/placebo treatments were stopped. Then in 1977, after one and a half treatment-free years, 354 children who had also been checked after six years were re-examined. This examination showed that "... cariostatic [anti-caries] benefits continue to be apparent for both [one and two] tablet treatment procedures at the end of seven and one half years.... Thus, the caries preventive benefit did not diminish as a result of discontinuing such treatment."

The study examined not only the protective effects of fluoride tablets, but also looked at the cost-effectiveness of using the treatment on large numbers of children. Overall, the fluoride treatments cost about \$25 per child for six school years and — if the post-treatment period is included — prevented 3.65 "decayed, missing or filled" tooth surfaces from occurring in each child during seven and a half years. This means that it cost about \$7 to prevent each decay, compared with the \$10 to \$20 it costs to have a decayed tooth filled. □

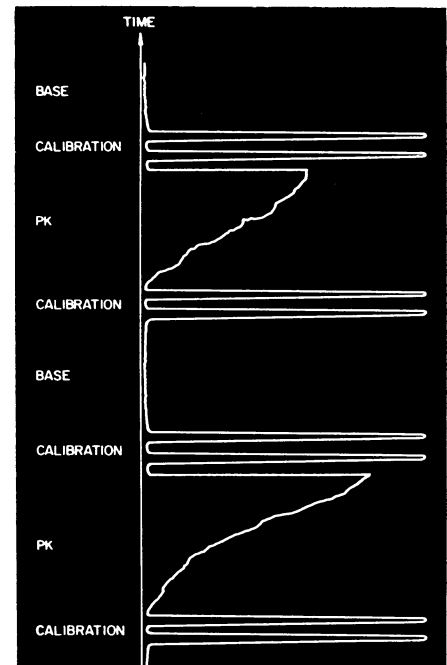


Chart produced by physical changes in a Fabry-Perot interferometer clearly shows different effects when a subject just relaxed (base) or tried to influence the instrument through psychokinesis (PK).

experiments, results of which can be scrutinized but not clearly interpreted. What the Princeton researchers have tried to do is design experiments in which the data are clear-cut and amenable to statistical analysis.

The work started when an undergraduate, Carol K. Curry, asked Jahn to supervise her independent study in psychic research