# Biology

*Julie Ann Miller reports from the meeting in Boston of the Society for Neuroscience*

## Babies and monkeys play same game

Jean Piaget, the Swiss psychologist, observed that babies make characteristic changes in their thinking process as they grow. If an 8-month-old infant watches an adult hide a small toy in one of two cups, the baby, after a delay of only a second or two, won't necessarily look for the toy in the place it is hidden. On the same test a 12-month-old always finds the toy, first try.

To learn what part of the brain is responsible for this maturity, scientists at Yale University in New Haven, Conn., are comparing the skills of babies with those of monkeys having damage to specific areas of the brain. Using the hidden-object test (food is used instead of a toy), Adele Diamond and Patricia Goldman-Rakic find that intact adult rhesus monkeys, and those with certain brain injuries, do as well as 12-month-old humans. But adult monkeys with lesions in the brain area called the prefrontal cortex do as poorly as 8-month-old babies. These monkeys, like the young babies, do not reach randomly for the object sought but, show a pattern of error. Both the young babies and the monkeys with damaged prefrontal cortex tend to reach first for the same hiding place they chose on the previous trial. They switch only after a hiding place proves to be empty on two or three trials, Diamond says. The prefrontal cortex is thought to play a role in spatial memory, as well as in generating emotional responses.

"These findings are an important demonstration of a link between the prefrontal cortex and a test sensitive to developmental changes in the cognitive ability of the human infant," the scientists say.

## A gene for the nerve cell sheath

The rapid transmission of signals along the long, output arm of a nerve cell depends on an insulating coating called myelin. The major structural protein of this material is abundant in the central nervous system; it represents 30 percent of the total protein. This myelin basic protein, as it is called, is very similar in rodents, pigs, sheep, cattle and humans. Scientists have now identified a rodent gene that produces it. They expect this finding to aid study of such human diseases as multiple sclerosis (SN: 1/30/82, p. 76), or Guillain-Barré Syndrome, in which myelin deteriorates.

The recent studies used brains of rats 18 days old, the age at which the greatest amount of myelin is synthesized. Messenger RNA, the molecules that carry information from the genes to the protein-making machinery of cells, was isolated and used as a template for making DNA molecules called cDNA. The scientists used the known amino acid sequence of rat myelin basic protein to chemically synthesize short pieces of DNA that would bind specifically to the cDNA representing that protein. When they analyzed this cDNA they found it to match at 126 of 127 positions, the reported amino acid sequence for one of the two myelin basic proteins from the rat. Roach says two different strains of rat were used in the determinations, therefore this single variation is likely to reflect a genetic difference.

The shiverer mouse is a mutant animal in which myelin is not properly wrapped around nerve cell fibers. By two weeks of age the mouse shows tremors, which eventually lead to seizures and death. These mice have less than one percent of the normal levels of myelin basic protein. Roach and colleagues find the shiverer mice make no messenger RNA that corresponds to the rat myelin basic protein messenger RNA, and analysis of the shiverer DNA indicates pieces of the gene are missing. "Probably the primary effect of the shiverer lesion is a deletion of genes leading to a mouse that cannot produce myelin basic protein," Roach says. In the October CELL, he and colleagues predict now genes for myelin basic protein of humans and other animals can be isolated and examined directly. They say, "The genetic contribution to human demyelinating diseases such as multiple scleorsis or Guillain-Barré Syndrome also can be probed."

# Technology

## Splitting light from materials

The proposed National Center for Advanced Materials (NCAM) at the Lawrence Berkeley National Laboratory (LBL) in Berkeley, Calif., "offers exciting opportunities for significant advances in this technologically important field," says the report of a Department of Energy (DOE) panel set up last March to review plans for the center (SN: 7/23/83, p. 52). But the panel report goes on to say, "Realization of the opportunities will, however, require substantial alterations of the proposal."

These recommended changes include the splitting of NCAM into two components: an advanced synchrotron radiation facility and a separate materials research center (now called simply the Center for Advanced Materials). This reflects the feeling that the light source can serve more than just the materials science community. In addition, a new DOE panel is reviewing the full spectrum of synchrotron light source proposals from several laboratories, including LBL, to establish national priorities and needs. Recommendations are expected by the end of the year.

Since its controversial birth earlier this year (SN: 5/7/83, p. 295), the CAM program has already shifted direction, in many ways anticipating the review panel's criticisms and responding to research needs as expressed by scientists and industry representatives at a series of workshops. While a laboratory devoted to surface science and catalysis is still planned, other research topics have been introduced. These topics include basic research on electronic materials (such as gallium arsenide), on advanced instrumentation for surface science and on structural materials (particularly ceramics, polymers and composite materials).

CAM's Martha Krebs says, "The whole point of CAM, the reason for establishing it, was to try and develop a new way for a national laboratory and university to interact with industry." A newly created scientific advisory board, which includes people from companies such as IBM and U.S. Steel, will aid in setting the center's goals. Krebs says, "A measure of the success of the program will be the extent of industrial collaboration."

## Superconducting computer freeze

IBM Corp. has decided that superconducting, Josephson junction switches are not the best circuits for building a high-speed, general-purpose computer. A Josephson junction consists of two thin layers of superconducting metals, such as lead or niobium, which act as electrodes, separated by an even thinner insulating layer. At liquid-helium temperatures, the metal's electrical resistance drops to zero, and electron pairs can tunnel across the insulating junction. An externally applied voltage can stop the current flow, allowing this device to be used as a switch. Despite the disadvantage of having to work at temperatures close to absolute zero, Josephson junction circuits appear attractive for computer circuits because they switch on and off faster and emit only one-thousandth as much heat as semiconductor transistors (SN: 9/13/75, p. 170).

What killed the superconducting supercomputer project was the rapid progress in other high-speed circuit technologies that narrowed the performance advantage offered by Josephson junctions. At the same time, IBM scientists found serious technical difficulties in fabricating the necessary Josephson circuits. In late September, the project ended.

An IBM spokesman says, "We're not cutting back on research in high-speed computer technology. The decision is to redirect our effort to those areas where we're making more progress." Because Josephson junctions may still be useful for future switching and communications devices, about one-sixth of the original IBM team of 115 researchers is continuing basic research on superconducting materials. Several Japanese companies and AT&T Bell Laboratories also have ongoing Josephson junction research projects (SN: 6/26/82, p. 423).