BIOMEDICINE

An LSD competitor

Samuel T. Christian and his neuroscience colleagues at the University of Alabama Medical Center have isolated and identified what appears to be a new neurotransmitter—a brain chemical that allows nerve cells to pass information to each other. It goes by the name of DMT (dimethyltryptamine).

They have also found that the site on nerves to which DMT binds is the same site to which the hallucinogen LSD binds. This observation suggests that LSD may exert its action by displacing DMT from its binding site. Even more provocative, they have discovered that DMT levels in the brain increase considerably when a person or experimental animal is placed in a situation of extreme stress. Since studies in other labs have linked schizophrenic episodes with stress in some cases, there might be a link between DMT levels and schizophrenic episodes.

A paper describing these results has been submitted to BIOCHEMICAL MEDICINE.

Child drowning: The mental outcome

If a child loses consciousness in fresh water and is apparently dead when rescued, there is a better than 95 percent chance that he will not experience brain damage. These surprising and encouraging results, based on a 54-case study, are reported in the Jan. 1 LANCET by John Pearn of the Royal Children's Hospital, Queensland, Australia.

Even more intriguing, Pearn found that the average IQ of survivors was above that of the general population. He attributes this high level not to lack of oxygen during near-drowning, however, but rather to the surviving group being self-selecting in some way—say, more intelligent parents are better resuscitators, and their children have an above-average preaccident IQ.

Families at risk for cancer

There is evidence that certain types of cancer are more prevalent in certain families than in others. But just how crucial is genetic background in one's susceptibility to cancer? A University of Utah Medical Center research group, headed by Homer Warner and Mark Skolnick, are trying to find out by linking the genealogy of 250,000 Mormon families with their medical records. Family pedigree annals are probably more detailed among the Mormons than among any other group in the United States.

If a strong genetic link is confirmed, the Utah researchers will then search for distinguishing traits of cancer-prone families—say fingerprints. Such markers, they envision, might be fed into a computer and used to identify cancer-prone individuals within these families. And once high-risk persons are identified, they might then be given certain cancer diagnostic tests that would be too expensive to give to the entire population and be counseled in ways to change their environment or life-style in order to avoid cancer.

Red cells thumb ATP

The ability of white blood cells to change shape, move around and gobble up solid and liquid materials has been shown to depend on how much of the high-energy molecule ATP is present in the cells. Not so for red blood cells, according to a study reported in the Jan. 13 NATURE by C. Feo and and N. Mohandas of Bicêtre Hospital, Kremlin Bicêtre, France.

The results, which conclusively show that red cell shape, movement and ability to take up materials are not energy-dependent functions, strongly suggest that white and red cells have different membrane systems for controlling these functions.

ASTRONOMY

Cloud collapse and star formation . . .

Astrophysicists' theories of the formation of stars usually begin with the formation of a protostar by the collapse of a cloud of interstellar gas. Such clouds are known to exist, and the assumption that they might collapse under their own gravitation appears reasonable, but it has been an assumption.

Now, for the first time according to its discoverers, Ronald L. Snell and Robert B. Loren of the University of Texas at Austin (ASTROPHYSICAL JOURNAL 211:L22), there is visual evidence of such clouds actually in the act of collapse.

The observation has to do with what are called self-reversed line profiles of carbon monoxide in several such clouds: Mon R2, W3, NGC 1333 and Rho Ophiuchi. Self-reversal is the superposition of some absorption on top of emission: Carbon monoxide in the hot core of the cloud emits its characteristic frequency of radio waves, but some of this is absorbed on the way out by a cooler outer layer.

Interpreting these self-reversed line profiles on the basis of the simplest model of gravitationally induced motion, namely, that the velocity of any part of the cloud was proportional to its distance from the center, the observers could not tell whether the cloud was expanding or collapsing. Now, however, they have adopted a "nonhomologous" model, in which the velocity is proportional to the square root of the distance from the center. With this they can calculate the observed carbon-monoxide emission for the four clouds. The occurrence of the self-reversal feature at a velocity higher than that of the peak emission indicates that the outer layers of the clouds are moving faster than the centers and thus collapsing onto them.

. . . And how to trigger it

One of the problems with the hypothesis that star formation begins with the collapse of a cloud of interstellar matter under its own gravitation (see previous note) is how such collapse is triggered. Something has to give it a push. One suggestion is that such a collapse might begin with compression of the cloud by a surrounding region of gas ionized and energized by a hot star. Such compression could cause a gravitational instability after which gravitational collapse would take over.

Evidence for such a process is now found in the Gum nebula, according to a report by Richard D. Schwartz of the University of Missouri at St. Louis, and will appear in the Feb. 15 ASTROPHYSICAL JOURNAL LETTERS. Observing from Cerro Tololo Inter-American Observatory in Chile, Schwartz found two sharp-edged dark clouds inside the nebula (which is a cloud of ionized gas). Furthermore, two Herbig-Haro objects, "peculiar" nebulas known to be associated with the early stages of stellar evolution, are embedded in one of the dark clouds. Schwartz considers the sharp edges of the dark clouds to be the result of compression shock waves proceeding from the surrounding ionized matter into the denser dark clouds.

How to observe cosmic dust

The interstellar clouds consist not only of gas molecules but also of solid grains. According to a suggestion by R. E. Lingenfelter of the University of California at Los Angeles and Reuven Ramaty of the Goddard Space Flight Center, something should be able to be learned about the grains by observing gamma rays they should give off. Such gamma rays should be emitted by atomic nuclei in the grains that have been struck and energized by cosmic rays. Lingenfelter and Ramaty calculate (ASTROPHYSICAL JOURNAL 211:L19) that some of these gamma rays should be observable. The best candidate is a line from oxygen 16.