BIOMEDICINE

Animal model for cystic fibrosis

Not long ago, Joel Wallach and Harold McClure, veterinary pathologists at Emory University's primate research center, noted that a dead rhesus monkey had abnormal mucus secretions and organ scarring indicative of cystic fibrosis. Some cystic fibrosis experts flew to Atlanta and confirmed that the animal indeed had cystic fibrosis identical to the human disease.

This is the first known case of cystic fibrosis in an animal. Wallach and McClure are now searching for new cases of the disease among rhesus monkeys. They are also trying to breed a supply of monkeys with cystic fibrosis, using the relatives of the one that died, because cystic fibrosis, in humans at least, is inherited. If they can get a colony of cystic fibrosis monkeys going, then an animal model for cystic fibrosis will at last have been found and will provide a source for better understanding the pathology of the disease and a test site for possible cures.

Potential drugs for muscular dystrophy

A striking feature of muscular dystrophy is an extensive loss of muscle proteins and their replacement by fat and connective tissue. Scientists aren't sure why this loss takes place, but they do know that the degenerative muscle contains enzymes called proteases.

Last year, A. Stracher, E. B. McGowan and S. A. Shafig of the State University of New York Downstate Medical Center at Brooklyn reported that chemicals that inhibit proteases delayed muscle degeneration in both normal and dystrophic muscle cell cultures. Now they report, in the April 7 SCIENCE, that the same chemicals can delay muscle degeneration in chickens with muscular dystrophy. Consequently the researchers believe that the chemicals, called leupeptin and pepstatin, might be used to treat patients with muscular dystrophy. Drugs to treat this disease are currently lacking.

Catching ESP in the act

If people could be shown to experience specific physiological changes while engaging in parapsychology phenomena, these alterations would constitute persuasive evidence that parapsychology really exists. So John Artley, an electrical engineer at Duke University, and Edward Kelly, a psychologist at Harvard University, will soon undertake the first systemic research to examine the physiology of parapsychology subjects.

Specifically, they will use an electroencephalogram to record brain waves, an electrocardiogram to examine heart electrical activity and an electromyogram to examine muscle tension as subjects engage in extrasensory perception (clairvoyance, telepathy and precognition) and psychokinesis (mind over matter). The weak electrical signals from the machines will then flow into a high-speed digital computer for analysis and identification of any physiological changes that occur while subjects engage in the various parapsychology experiments.

The experiments, which are scheduled to run three years, will be conducted at the Duke University School of Engineering.

Cancer drugs: a status report

Since the National Cancer Institute began massive screening of potential cancer drugs more than 20 years ago, it has tested 475,000 chemicals — 275,000 synthetic and 200,000 natural — to arrive at 50 drugs now in use and 50 in clinical trials. So reports RESEARCH AND INVENTION (No. 17, winter 1977-1978), a newsletter of Research Corporation of New York City. The 50 drugs now in use for 10 out of 100 types of cancer compare to only six drugs available in 1954.

SPACE SCIENCES

Pioneer 11 plasma sensor restored

The Pioneer 11 spacecraft, on its way to a September 1979 rendezvous with Saturn, has been approaching the event with only 10 of its dozen scientific instruments in working order. Now there are 11.

One of the inoperative instruments has been the craft's plasma analyzer, designed to monitor the solar wind and its interactions with planetary magnetic fields. Both Pioneer 11 and its predecessor, Pioneer 10, showed the solar influence still to be surprisingly strong as far from the sun as Jupiter, and the Pioneer 11 data could be particularly important at the greater distance of Saturn. (The Voyager 1 and 2 spacecraft, also bound for the outer planets, will not reach Saturn until November 1980 and August 1981 respectively.) Pioneer 11's plasma sensor, however, had stopped working about four months after its Dec. 3, 1974, encounter with Jupiter, and had defied repeated attempts at reactivation. (The other inoperative instrument is an asteroid-meteoroid detector, which was turned off deliberately when its photocells grew too cloudy for use.)

Now the plasma analyzer is working again. After exhaustive analyses of telemetry from the instrument, and after sending a variety of commands that proved ineffective, spacecraft controllers at the NASA Ames Research Center in California decided to try turning on the instrument's high-voltage power supply in hopes that it would "thermally shock" the output circuits into operation. The effort apparently worked. Or at least, 36 days later, NASA tracking stations began picking up the first transmissions of data from the instrument in nearly three years. Since then, the sensor has responded to all commands, and seems to be ready for Saturn.

It is also fortunate that the instrument woke up well over a year before the encounter. Pioneer 11's path from Jupiter on one side of the sun to Saturn on the other has taken it as much as 17 degrees above the plane of the ecliptic, and the revived solar-wind sensor can thus collect data along at least the downward part of that curving track. Measurements of the solar wind from the previously unsampled regions out of the ecliptic plane will serve growing scientific interest in how the sun's influence changes at high solar latitudes.

Venus clouds about five-sixths acid

Sulfuric acid, identified several years ago as a major constituent of the clouds of Venus, may in fact comprise more than five-sixths of the clouds' composition by weight, according to a team of scientists at the NASA Ames Research Center.

The acid concentration in the droplets making up the clouds, according to James B. Pollack and colleagues, is 84 ± 2 percent in the clouds' top "unit optical depth," which covers a range from about 68 to 80 kilometers above the planet's surface. The concentration, reported in ICARUS (34:28), was calculated from 2.9- to-3.4-micron reflectance spectra obtained through the 91-cm telescope aboard NASA's Kuiper Airborne Observatory. At the cloud bottoms — about 49 km above the surface according to the Soviet Venera landers — the concentration (inferred primarily from vapor-pressure arguments) is the same, 84 percent, albeit with a larger uncertainty of ± 6 percent. Previous estimates were as low as 75 percent. The acid-rich clouds also substantially reduce the atmosphere's already minuscule water content, the researchers calculate: Below the clouds it is between 0.0006 and 0.01 by volume, while above them it is only 0.000002.

The Ames researchers calculate from shorter-wavelength spectra that the clouds' total optical depth (the degree to which they block the passage of light) is between 25 and 50, equivalent to a heavily overcast day on earth — and suggestive of a substantially better-lit surface than formerly believed.