CHEMISTRY

From our reporter at the American Chemical Society meeting in New York City

From poison dart to medicine

For centuries, Colombian Indians have rubbed their blow-dart points on the backs of certain frogs that secrete toxins so deadly the darts can kill large animals. Recent research has shown how these poisons act on a victim, and the resultant knowledge may soon lead to new medicines. John Daly and Bernard Witkop of the National Institutes of Health reported on the work.

The poisons apparently interfere with the ion exchange needed for nerve function. One of the most poisonous, batrachotoxin, changes the permeability of nerve cell membranes to sodium, blocking impulses and causing cardiac arrest. Since the substance initially increases the force of heart contractions, it may someday be adapted for use in heart disease.

The poisons also make valuable research tools. Batrachotoxin, for example, is helping reveal how nerves transmit pulses. Composition of poisons from different frog species may give new information on the evolutionary process, both of the frogs themselves and of their snake predators, which are immune.

Competitive coal gasification

A preliminary economic study of a process for gasifying coal while it is still in the ground shows that such *in situ* techniques may be competitive with the present method for gasifying strip-mined coal. The new process was developed by the Lawrence Livermore Laboratory (LLL); the economic report was prepared by industry experts from Williams Brothers Process Services, Inc., Amoco Production Co. and Pacific Gas and Electric Co.

The estimated cost of producing pipeline-quality gas by the LLL process ranged from $1.85 to $3.31 per million cubic feet, depending on assumptions about the efficiency of several steps in the process. The comparable figure for the present "Lurgi" gasification process is $2.85.

In the LLL process, coal in seams up to 3,000 feet deep is shattered by explosions, and a mixture of oxygen and steam is forced into the seam, producing carbon monoxide, hydrogen and methane. Such *in situ* gasification could provide an alternative to dangerous deep mining or environmentally disruptive strip mining. Experimental field trials are underway.

Lightweight storage batteries

The cost and weight of conventional storage batteries have held back development of electric cars—nearly half a ton of such batteries are required. A new class of ceramic membranes, also called solid electrolytes, may overcome some of these problems. Batteries using them also charge up faster and may be useful in converting heat to electricity.

The latest membrane, made of zirconium phosphosilicate, was described by H. Y-P. Hong of the Massachusetts Institute of Technology. In a battery, a solid electrolyte is placed between a pool of molten sodium and one of sulfur. When heated to 300°C, sodium atoms become ionized and pass through the membrane to react chemically with the sulfur, while electrons are blocked. The newest membrane allows ion exchange to take place more quickly, is more resistant to stresses of repeated recharging, and can be operated at higher temperatures than previous ones. Though commercial versions are some years off, prototype batteries have been operating for some four months now. A car might eventually run off of only 100 pounds of such batteries.

BIOLOGY

From our reporter at the annual FASEB meeting in Anaheim, Calif.

Putting blood flow on television

Blood flow through tiny blood vessels in the human body is often changed by high blood pressure, hardening of the arteries, diabetes and other diseases. Women with very cold hands suffer from a microcirculation problem. Precisely how microcirculation occurs under normal and abnormal conditions, however, has eluded study because the diameter of capillaries is incredibly small.

Now an ingenious technique to study people's minute blood flow has been devised by Bent Fagrell, a microcirculation scientist, A. Fronek, a surgeon, and Marcos Intaglietta, a bioengineer, all from the University of California at San Diego.

An ordinary light microscope is focused on an area of skin that has been covered with a drop of paraffin oil. (The oil allows better resolution and higher magnification of the image.) This setup magnifies the area 250 times, large enough for easy observation of capillary blood flow. A special television camera, mounted on the microscope, supplies information recorded on video tapes. Later the video tapes can be played back through special electronic equipment that analyzes the picture and produces quantitative measures of the velocities of blood flow in the capillaries.

Hypothalamus and food intake

The hypothalamus is a small segment of neurons located at the base of the brain. It influences hunger, and researchers are slowly learning more and more about the hypothalamus's role as an appetite-control center.

In recent years, for example, investigators have shown that a disturbance in the ventromedial area of the hypothalamus leads to overeating and obesity, and that decreased availability of sugar to neurons in this area of the hypothalamus might be the cause. Now it appears that the hormone insulin regulates sugar intake by these cells, A. F. Debons of the Veterans Administration Hospital, Bronx, N.Y., reports. This insulin effect can in turn be antagonized by certain pituitary hormones and adrenal hormones, he has found.

In brief, the hypothalamus's regulation of hunger is controlled not only by nutrients, but also by hormones. And this finding has some intriguing ramifications. For example, stressful events in one's life are known to increase the output of adrenal hormones, and also to induce many people to overeat. The tendency to overeat may result from excess adrenal hormones upsetting the hypothalamus's sugar intake.

Rats on the MTA

Visualize hypertensive rats exposed to an hour-long subway ride twice daily, five days a week, just as many hypertensive human commuters are subjected to. What do you think might happen to them? Arthur M. Sackler and A. Stanley Wiltman of Long Island University wanted to find out. So they crowded hypertensive rats together in vibratory cages and exposed them to tapes of subway noise.

Unlike "Charlie on the MTA," whose "fate is still unlearned," many of the subway-stressed hypertensive rats died within 16 weeks after the start of the experiment. None of the unstressed hypertensive rats died within this period. So Sackler and Wiltman believe that attention should now be paid to whether human subway commuters suffering from high blood pressure also face a decreased life span.