

Goat-to-steer cud transplant

Microorganisms taken from Hawaiian goats and given to Australian steers allow the steers to digest a forage plant that formerly made them ill. The plant is leucaena, a leguminous shrub that could be a valuable feed plant, according to the U.S. Department of Agriculture. Leucaena resists droughts and stabilizes soil on slopes. It produces high yields of protein-rich fodder that is considered comparable to alfalfa in feed value.

Cattle and goats in Hawaii thrive on leucaena, but cattle eating it in Australia stop gaining weight, lose hair and get goiter and ulcers. Raymond J. Jones of the Australian Commonwealth Scientific and Industrial Research Organization has shown that microbes in the first stomach, or rumen, of the Hawaiian goats degrade a toxin produced from leucaena by enzymes both in the rumen and in the leucaena leaves. The toxic product, called 3-hydroxy-4(1H) pyridone (DHP), comes from the toxic amino acid mimosine. Microbes from steers and goats in Australia, as well as in Iowa and Texas, do not degrade DHP.

When Australian animals are inoculated with the Hawaiian microbes, however, they can consume leucaena as more than 30 percent of their diet, Jones says. He found that animals receiving the microbes transmitted them to other animals in the herd. Scientists are now working on practical means of inoculating large numbers of cattle with the Hawaiian microbes.

Single nerve cell triggers an escape

The action of a single nerve cell, stimulated after a cricket detects the ultrasonic signal of a bat, permits the cricket to change its flight direction and escape its predator, according to Cornell researchers. Such single-cell control of an important behavior had previously been reported only in crayfish and some bony fish.

The scientists, Ron R. Hoy, Thomas G. Nolen and colleagues, are attempting to construct a "wiring diagram" for crickets to explain their behavior in terms of the capabilities and connections of their nerve cells. The investigators find that in contrast to the cricket's simple and speedy response to a predator, a more complex neural network is required for the first stage of mating. There the cricket uses its neural circuitry to analyze pitch and rhythm of other crickets' songs in order to identify a suitable mate. The scientists suggest that, for survival, speed is of much greater essence in escape behavior than in mating. Hoy says, "In the animal world there are two kinds of prey, the quick and the dead." The report appears in the Nov. 23 *SCIENCE*.

Ceramic channels for cell culture

The growth and harvest of large quantities of animal cells is a prerequisite to making commercially available many of the laboratory advances of biotechnology, including some viral vaccines and therapeutically important proteins. A variety of methods for growing animal cells are now in use in laboratories, but they are difficult to adapt to the large scale required for pharmaceutical manufacturing. Scientists at KC Biological in Lenexa, Kans., now propose a ceramic matrix as the support for animal cell growth.

In the January *BIO/TECHNOLOGY*, Bjorn K. Lydersen and colleagues describe experiments using ceramic cylinders containing channels 1 millimeter square passing in parallel through their length. These vessels provide, in a relatively small volume, a large amount of surface area. To create an automated cell-growing system, Lydersen and colleagues encapsulated a ceramic matrix in an open-ended glass cartridge connected at both ends to an apparatus that circulates gas-permeated, nutrient medium through the matrix. The system monitors acidity and dissolved oxygen and automatically adjusts the mixture of gases provided. Eight out of 10 cell types tested—derived from human, monkey, hamster, chicken, trout and mosquito—grew to

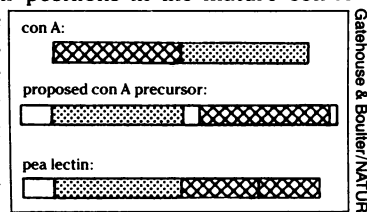
greater density in the ceramic chamber than in conventional containers. In more recent experiments, the scientists used a ceramic of a slightly different composition and with a rougher surface to immobilize other cells, which do not naturally adhere to surfaces. This method has increased the yield of antibody from the hybridoma cells used to produce monoclonal antibodies.

So far, the largest ceramics that have been used for cell culture have more than 18 square meters of surface area and can produce more than 10^{11} cells. Lydersen and colleagues say, "... no practical limits to further increases in scale have been encountered, and therefore significantly larger systems utilizing the ceramic are being developed."

Turnaround in seed protein construction

Seed proteins are often made out of components cleaved from a precursor molecule. But biologists now suggest a particularly puzzling assembly plan for the jackbean's seed protein, concanavalin A (con A). They propose that the protein is produced by rejoining, in transposed order, the two major segments of its precursor.

British scientist D. M. Carrington of the University of Cambridge in England and colleagues isolated a DNA sequence that they argue represents the complete con A precursor. From its DNA, this precursor appears to have two segments arranged in the opposite order from their positions in the mature con A molecule. Their order in the jackbean con A precursor is the same as in the mature form of a related protein, lectin, in pea seeds, the scientists report in the Jan. 3 *NATURE*. To produce con A from the proposed precursor requires several cleavages and then ligation of transposed pieces. "But the postulated final ligation step is unprecedented and should be treated with caution," warn John A. Gatehouse and Donald Boulter of Durham University in England. "One suspects this system still has a few tricks up its sleeve."



Biology briefs

- Subscribers to the scientific journal *CELL MOTILITY* now receive supplemental video disks, so they can observe the cell movements described in the journal articles. "Viewers of these video disks can reanalyze the raw data and draw their own conclusions," says the journal's editor, Robert D. Allen of Dartmouth College in Hanover, N.H., who has developed a method of microscopy that enhances images by using video displays (*SN*: 4/11/81, p. 234).

- A new resource for geneticists may soon be the pedigrees of the Daughters of the American Revolution (DAR). The national society has announced a "DAR Family Tree Genetics Project" in conjunction with the Vanderbilt University Medical Center in Nashville, Tenn. The group's 210,000 members have been asked to respond to a confidential survey about their ancestors' deaths and about health problems of recent generations. These families have unusually extensive historical records — to be a DAR member, a woman must be able to prove that she is a descendant of a Revolutionary War soldier.

- An expanded version of the "Exploring Microscope" exhibit (*SN*: 3/31/84, p. 204) has opened in New York City at the IBM Gallery of Science and Art. The show now includes a more extensive history of microscopy, more exhibits of modern, specialized instruments, including an X-ray microscope, and six microscopes for visitors to try out for themselves.