

CHEMISTRY

Bacteria Aid Cell Study

Important new developments in chemistry from cell growth to propellants for spaceships are reported by Elisabeth Mitchell from the American Chemical Society meeting.

► STARVING BACTERIA have helped the study of human cell growth, the American Chemical Society was told in Atlantic City.

Nutrition may play a leading role in the development of many different types of cells, such as skin, muscle, liver and brain cells, from one single fertilized cell, Dr. Gerrit Toennies, Institute for Cancer Research, Philadelphia, told the meeting. When the diet of a single-celled bacterium was modified or limited, it stopped growing normally and produced changes in the cell structure of the organism, he explained.

Like man, this cell, *Streptococcus faecalis*, needs nutrients in the form of building blocks called amino acids, for the production of new protein to live and grow on. It normally multiplies by first growing in size, then dividing into two cells that are exact "carbon copies" of itself. The nature of the growth can be changed by controlling or limiting different amino acids, Dr. Toennies said.

For instance, after the amino acid valine is used up, no new protein is produced and therefore there is no further cell division. However, the cell continues to synthesize

wall and membrane material until the cell contains about twice the normal amount.

On the other hand, when the amino acid threonine is depleted, cell division continues, along with wall and membrane synthesis. In this case, cells about one-third smaller than usual, with walls of double thickness, and membranes of single thickness, are formed, Dr. Toennies reported.

• Science News Letter, 82:187 September 22, 1962

Speed Wound Healing

► CHEMICALS from wheat can speed the healing of wounds by as much as 57%, it was announced at the American Chemical Society meeting in Atlantic City.

The materials used were gluten sulfate, a highly absorbent powder made from wheat flour, and sulfated starch, a chemical which prevents blood coagulation, Dr. H. C. Reitz, Purdue University, told the meeting.

Gluten sulfate alone can increase the rate of healing by 35%, Dr. Reitz said, but the sulfated starch enhances this property—a totally unexpected result. Perhaps the bleeding caused by this compound brings nutrients from the blood, while the water-

absorbing material holds them in place, he suggested. The mechanism of healing is very complicated, and many unknown processes are going on at the same time, he explained.

The tests were made on male rats, and the amount of healing was determined by how long it took flowing water to tear the wound apart. Several chemicals containing sulfur were tested, including sulfated gelatin, starch and cellulose, but these showed only a slightly positive effect.

Dr. Reitz emphasized that the report is only preliminary.

"When we wonder how gluten sulfate aids in the healing process, we are practically at the frontier of biological knowledge, where most of our thoughts are still guesswork," he said.

It has been shown, however, by other workers using radioactive sulfur compounds that sulfur is used by the body in the early stages of healing. Gluten sulfate may make this sulfur available at the site of the wound, he added.

"Gluten sulfate takes up to 300 times its weight of cold water almost instantly to form a firm gel, but does not dissolve in water," Dr. Reitz said. This tremendous absorbing property aids in drying up the wound and helps reduce the amount of scar tissue.

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Pigment May Help Vision

► THE SAME CHEMICAL that gives you that golden tan from the summer sun may also help you to see.

The brown pigment, melanin, may take part in controlling the messages sent from the eye to the brain, Lieut. Raymond J. Sever, U.S. Navy, told the American Chemical Society in Atlantic City. Melanin is found in the retina, the light sensitive part of the eye. Here, the energy of light is picked up and changed into nerve impulses. It is not known how this is done, he said.

When melanin, extracted from cows' eyes, was exposed to light, there was a rapid appearance of free radicals—high energy particles capable of creating an electric charge, Lieut. Sever continued. These free radicals could produce an electrical voltage across the retina, thus controlling the nerve impulses from the eye to the brain, he suggested.

Free radicals might also be involved in protecting the skin against sunlight, Lieut. Sever said.

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Sex Lure Insect Repellent

► SEX APPEAL may be an effective insect repellent, it was announced at the American Chemical Society in Atlantic City.

The sex attractant from the female American cockroach has been isolated, and when placed in minute amounts in poisoned traps effectively lures the male, Dr. Denis Wharton, Army Quartermaster Research and Engineering Command, told the meeting.

The fact that the sex lure of the female cockroach attracts only the male of the same



MINIATURE COOLER—A Lilliputian refrigerator to improve the sensitivity of military infrared detectors, whose noise level drops with their operating temperatures, has been developed by Westinghouse. Donald Haase, a technician at the Westinghouse Astroelectronics Laboratory, uses a four- and six-power eye loupe and jeweler's tools as he works on the model cooler, which is still larger than the actual device.

species is an advantage, Dr. Wharton said, since it will eliminate the danger, to humans and animals, present in general poisons and other current exterminating methods.

Synthetic sex attractants might be used to evaluate size and location of insect populations, suggested Dr. Morton Beroza, U.S. Department of Agriculture scientist, speaking at the same symposium on pest control. This may lead to elimination of some insects with a minimum of hazard to man and animals.

Dr. L. D. Christenson, U.S. Department of Agriculture, reported that the synthetic sex attractant, methyl eugenol, when used in combination with an insecticide, was successful in attracting and killing male oriental fruit flies. Results of field tests in several islands of the western Pacific suggest that the technique might be used to detect and eliminate the fly in widespread areas.

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Chemical Process Test

► OF DOLL HOUSE size, plastic models of chemical process equipment have been used at the laboratories of Standard Oil Company (Ohio), Cleveland, to pioneer and test new methods of making chemicals, Dr. E. C. Milberger told the American Chemical Society in Atlantic City.

Costs of development are reduced by the technique of first performing the operation in a plastic mock-up model of bench scale, then enlarging it in steel and finally applying what was learned to a pilot plant. The process described was the reaction of vaporized hydrocarbons using solid material fed into the reaction.

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Purify Radioactive Water

► HOUSEWIVES can use flower pots to purify water contaminated by fallout.

Clay and loose subsoil can effectively remove 80% to 95% of the radioactive strontium and cesium, William J. Lacy, Office of Civil Defense, Washington, D. C., told the American Chemical Society meeting in Atlantic City.

An ounce of clay is enough to remove most of the strontium-90 from a gallon of water under some conditions, while cesium-137 can be removed three times as efficiently, the chemist said. About 85% of the strontium is removed by stirring clay with the water, and more than 90% by letting the water flow through a column of the clay.

In the event of nuclear war, the primary hazard is not contamination by biological ingestion, Mr. Lacy told SCIENCE SERVICE, since external damage from direct radiation would be fatal. A local pool or well that is thought to be contaminated, however, can be filtered locally and effectively with flower pot soil, paper towels, and commercial bleach, he said.

The disposal of radioactive wastes is an even greater problem, he continued, since the material is soluble and more biologically available, if not properly stored. By adsorbing the radioactive material onto the clay, the storage problem can be reduced many hundredfold.

The soils tested, ranked in order of their ability to remove strontium-90 were: Conasauga shale, Fithian illite, New Mexico kaolinite, Wyoming bentonite, North Carolina vermiculite, and Utah halloysite.

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New Liquid Propellant

► A SUCCESSFUL propellant has been developed which promises smaller and lighter spaceships, the American Chemical Society was told in Atlantic City.

Landing on the moon will be safer and easier, using oxygen difluoride, Dr. David J. Mann, Thiokol Chemical Corporation, said. This easy-to-store liquid propellant behaves well at outer-space temperatures, and can save up to 31 feet in length of the upper stage of the Saturn rocket. Seven feet in length and 350 pounds in weight can be saved on an Apollo type vehicle with the new propellant, he said.

Oxygen difluoride is a high energy oxidizer that is used to "burn" another substance—diborane or monoethylhydrazine—to provide the force necessary to drive a rocket. The two substances ignite spontaneously when mixed, he reported.

Oxygen difluoride is easier to handle than fluorine, Dr. Mann said, and does not form the highly corrosive hydrogen fluoride that fluorine does when traces of water are present. Also, oxygen difluoride is not shock sensitive and will not alone support combustion.

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TECHNOLOGY

Radar Trap Used For Clocking Birds

► SPEEDING BIRDS beware! Radar traps are clocking you.

A portable radar has been used successfully to clock birds in flight. Speeds up to 70 miles per hour have been marked in the book of Dr. Wesley E. Lanyon, assistant curator in the ornithology department of the American Museum of Natural History in New York.

Leading speedster of the feathered world thus far clocked with radar is the ring-necked duck at 66 miles per hour, Dr. Lanyon reported. The bobwhite has reached 45 miles per hour and the game farm pheasant hit similar top speeds. Even the cumbersome turkey could fly 32 miles per hour, he said.

The fastest bird previously recorded was a swift in Mesopotamia traveling at an estimated 200 miles per hour.

The "trap" was designed and built by Dr. Orville Dunning, radar engineer and amateur ornithologist. It uses the principle of the Doppler effect, recording the movement of moving objects by bouncing radar waves from the bird and recording the frequency shift of the returned waves as an audible signal on tape and recording it on a meter.

This new unit, which has documented the speed of vehicles on our highways, Dr. Lanyon said, can now eliminate the guesswork in determining the flight speed of many species of birds.

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Do You Know?

Soils are the most difficult construction material to test in the laboratory because of the difficulty in securing undisturbed samples.

The huge reefs of Eniwetok Atoll contain more than 250 cubic miles of limestone.

Excessive pruning of staked tomatoes will result in lower yields and will cause fruit to crack.

The shark's skin covered with a coating of overlapping teeth-like studs is impossible to penetrate under water even with a very keen knife.

Rocket powered vehicles are unstable when launched, and a restoring force must be provided.

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