

IMMUNOLOGY

Clues to Disease Control Seen in RNA Research

► **CLUES** to controlling hereditary diseases and even cancers deficient in certain body chemicals are seen in the effect of ribonucleic acid, or RNA, on cells growing in tissue culture.

Dr. Harold Amos of the department of bacteriology and immunology, Harvard Medical School, Boston, added RNA extracted from mouse cells to cells from chick embryos, thus endowing the chicken cells with the properties of another species.

The chicken cells took up the mouse RNA and began manufacturing mouse proteins that became a part of the living chicken cells. Antibodies that normally react exclusively with mouse cell proteins reacted with proteins from the transformed chicken cells as well.

The American Cancer Society, which, with the National Institutes of Health, Bethesda, Md., supported the work of Dr. Amos, explains that inherited diseases are caused by a chemical defect in the gene DNA. The defective gene DNA manufactures defective messenger RNA, which in turn either manufactures defective protein or none at all. The disease symptoms are caused by the absent or defective enzyme or other protein.

Now that it has been shown that cells growing in tissue culture can be profoundly changed by RNA, even from a different species, the question arises as to whether the same thing can be done in the living animal or in humans. If it can, it may be possible to periodically transform the chemistry, and hence the function, of sick systems, researchers say.

If various cancers turn out to be due to protein defects, caused by the action of viruses, rays or chemicals on cell DNA or RNA, they also might be treated with healthy RNA.

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GENERAL SCIENCE

European Science Camp Open to American Teens

► **OPPORTUNITIES** are open to American teen-age youth for working with Europeans in science camps predominantly for Europeans. The Sixth International Camp is being organized in Belgium and will take place at Coq-sur-Mer from July 5 to 15. There will be participants from France, Great Britain, Germany, Holland, Italy, Norway, Sweden, Belgium and, hopefully, the United States. Science club members and particularly finalists in the National Science Fair-International can apply to Mr. F. Wattier, Secretary General, Interim Coordinating Committee, 147, Chaussee de Haecht, Brussels 3, Belgium.

Other camps to which qualified Americans will be welcomed are the Camp of the Jeunesses Scientifiques de Belgique, the science camp to be organized in France by the Mouvement Jeunes-Science during the second fortnight of July, and a camp in Germany to be held in August.

There is opportunity for a few young Americans to join a British Party following the International Youth Science Fortnight leaving London Aug. 12, 1965. The group will journey from Dover to Ostende; down the Rhine by boat; overnight at Rudesheim; visit historic and botanical sites at Salzburg; see scientific Vienna; visit a Czechoslovakian factory; visit the University, a computer, and opera in West Berlin; visit East Berlin, Hanover and Amsterdam; sightseeing in Amsterdam and Holland; visit a refinery in Rotterdam and return to London on Aug. 31. Details may be requested from London International Youth Science Fortnight, 308 Earls Court Road, London SW5, England. Cost has been set at \$150, not including the Trans-Atlantic fare.

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SEISMOLOGY

Wildlife Will Be Safe From Nuclear Explosion

► **MIGRATORY WATERFOWL**, sea otters and other wildlife of Amchitka Island near Alaska will hardly feel a thing when a nuclear explosion equal to 80,000 tons of TNT goes off next November, some 2,300 feet underground.

Studies and explosions made in the vicinity of the Aleutian island last year have satisfied various scientists that the experiment can be conducted without danger to humans or wildlife populations in the Aleutian Islands National Wildlife Refuge, said Dr. Robert Frosch, Advanced Research Projects Agency, Department of Defense.

The explosion will be set off in an attempt to study shock waves of an underground nuclear device in a highly seismic area, Dr. Frosch told members of the Conservation Round Table.

It will help scientists differentiate waves caused by natural earthquakes from those caused by man in possible violation of the Nuclear Test Ban Treaty. The Soviet Union and the French are the only other nations that have detonated underground nuclear explosions.

The explosion will be fully contained. That is, it will allow no radioactive material to come to the surface, Dr. Frosch explained. It will take from 40 to 400 years for any radioactive ground water to sink down through the island and trickle into the seawater, he said.

The lonely island of Amchitka, which is about three to five miles wide and about 30 miles long, is a tundra composed of volcanic material and covered with potholes and lakes. No rare wildlife inhabit the island and no human beings live there.

The island lies in the earthquake-sensitive belt that encircles the Pacific Ocean, and is subject to several earthquake shocks larger than that of Long Shot, as the proposed nuclear explosion is called.

Several Federal agencies have been consulted in selecting the site, including the Fish and Wildlife Service, Geological Survey, Coast and Geodetic Survey, Department of Health, Education and Welfare and the Atomic Energy Commission.

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IN SCIENCE

PUBLIC HEALTH

Ailments Curb Action Of 22 Million in U.S.

► **MORE THAN 12%** of this country's people are limited in their activities because of chronic disease or impairment, a U.S. Public Health Service report reveals.

Heart conditions and arthritis and rheumatism lead the various causes that keep 22.2 million people from working.

As might be expected, the ability to get around and work or play decreased with age, the two-year survey by the National Center for Health Statistics found.

Only about two out of each 100 persons under the age of 17 were limited, but about 49 out of each 100 persons aged 65 and older reported some degree of activity handicap.

Mental and nervous conditions accounted for 7.7% of the limitations, impairments of the back or spine, except paralysis, 7.5%, impairments of lower extremities and hips, 6.2%, and hypertension, or high blood pressure, without heart involvement, 6%. Heart conditions kept 16% from normal activity and arthritis and rheumatism afflicted 14.7%.

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BOTANY

Small Endive Plants Grow From Single Cell

► **FULLY FORMED** tiny endive plants have grown from single cells removed from the stalks of young endives.

For the first time, scientists at the University of Wisconsin, Madison, have been able to grow a complete plant from a single cell that is not a seed or reproductive cell.

The cells were taken from the stalks or bodies of embryonic endive plants, Drs. I. K. Vasil, A. C. Hildebrandt and A. J. Riker of the university report. Supported by the American Cancer Society, the studies are aimed at distinguishing normal from abnormal growth, and discovering how to control abnormal growth.

When single body cells were placed in cultured media containing coconut milk, they began to multiply and eventually formed disorganized and shapeless growths called callus.

These callus tissues were then vibrated apart into single cells and suspended in special fluid. During the course of several months, the single cells began to divide and redivide, and some of them formed specialized structures. Two years later, clumps were formed with small roots at one end and leaves at the other—miniature endive plants.

Other experiments were successfully conducted on single tobacco cells that produced leaf-bearing tobacco plants.

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CE FIELDS

GEOLOGY

Diamonds Found Under Atlantic Ocean

► "LOTS OF DIAMONDS" are being surveyed in deposits 100 to 150 feet under the Atlantic Ocean, off southwest Africa.

In the past year, more than 3,000 holes have been dug in underwater diamond gravel beds by a special ship, the *Rockeater*, designed by Ocean Science and Engineering, Inc., of Washington, D.C.

By twisting, turning and moving sideways, the ship can be positioned to bore holes 20 inches in diameter and 20 feet deep through diamond gravel off the African Coast, north of the Orange River, said Willard N. Bascom, president of the company.

Mr. Bascom said he could give no figures on the value of the findings because of "political implications."

The diamonds may have been washed down the Orange River 50 million years ago, Mr. Bascom told the Executive Committee of the Associates of the Woods Hole Oceanographic Institution. They were stored in sedimentary rock under the sea until the Ice Age a million years ago, when the sea level dropped and exposed this diamond-studded rock to the action of waves. By the constant grinding and pounding of the sea, the boulders of other rock were gradually worn down, and the diamonds, hardest rocks on earth, were exposed.

Geologists have been prospecting along the raised land beaches of this diamond area of Africa for more than 40 years, said Mr. Bascom. Now the diamond deposits under the sea are being surveyed. Once the deposits are mapped out, geologists hope to start the actual mining.

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SPACE

Orbiting Space Reactor Power System Fails

► THE ORBITING SNAP-10A space nuclear reactor power system, after 43 days of successful operation, has shut down for reasons not known at present.

The system, launched into a 700-nautical-mile orbit from Vandenberg Air Force Base, Calif., on April 3, 1965, had been operating normally until May 16, 1965.

The satellite containing SNAP-10A circles the earth every 112 minutes and will remain in orbit more than 3,000 years.

The first indication of a malfunction came on May 16 when the spacecraft failed to report during its pass over the Hawaii tracking station.

After about a day and a half of silence, some telemetry signals began to be received again. Power for this telemetry is derived from a battery designed to function in case of reactor shutdown.

Telemetry data are being analyzed to try to determine the sequence of events and whether the origin of the malfunction was in the power conditioning, telemetry or reactor system.

The objective of the flight test was to establish the feasibility of operating a nuclear reactor power system in space, starting it by remote signal, placing it on static control, and then continuing operation on an endurance run of 90 days. The reactor was put on static control the sixth day after launch.

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IMMUNOLOGY

New Bacterial Vaccine Controls Cattle Disease

► THE FIRST KNOWN vaccine to control a disease of cattle causing infertility and reduction of offspring has been developed.

Intensive tests were conducted on research and range herds in Colorado, Nebraska and Wyoming to vaccinate some cattle with the new bacterial vaccine, while other cattle were not vaccinated, reports the American Veterinary Medical Association. Results in one herd showed that 97% of vaccinated cows became pregnant, compared to 84% of non-vaccinated cows which has been mated with bulls infected with the infertility disease, called vibriosis.

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PHYSICS

Highest Sound Waves Are New Scientific Tool

► SOUND WAVES a million times higher in pitch than those audible to the human ear are providing scientists with a new tool to learn about the structure of matter.

The technique is such a sensitive method of studying sound propagation that it can be used to detect small amounts of impurities or tiny changes in temperature.

Nobelist Dr. Charles H. Townes, provost of Massachusetts Institute of Technology, Cambridge, told the American Physical Society meeting in Washington, D.C., that interaction between light and sound waves is the key to the new tool.

The highly intense light of a laser beam is used to generate the sound waves, hypersonic vibrations as high as 60,000 million cycles a second. Experiments are planned with diamonds, which should yield frequencies of 300,000 million cycles a second.

Dr. Townes said studies are now being made by R. Chiao and P. Flevvy in his laboratory of a number of liquids, and that water and toluene had so far showed particularly interesting peculiarities in acoustic propagation, which are related in some way not yet clear to the structure of these liquids.

Although the acoustic waves can modulate light, no commercial uses seem near at this time for the hypersonic waves, which are so intense they sometimes cause crystals in which they are generated to crack internally. Dr. Townes said the hypersonic waves are actually "phonon masers".

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CHEMISTRY

Rock Salt Made Rustproof for Winter

► ROCK SALT, which often causes expensive rust damage to cars after it has been tossed onto icy streets, can now be made virtually "rust proof."

A new rust stopper, called Carguard, is applied to the rock salt. It contains two rust inhibiting agents that provide both an electrical and a physical barrier against corrosion. The product cut body rust up to 87% in recent winter road tests.

The inhibitor, developed by Cargill, Inc. in Minneapolis, will be used on the salt available to cities, counties and states this summer for use next winter.

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GENERAL SCIENCE

THINGS of Science Features Gemini Model

► THE U.S. SPACE PROGRAM is being translated by SCIENCE SERVICE for youthful rocketeers from the abstract of the news reports to the realism of actual scale model participation.

Latest in SCIENCE SERVICE's youth program feature, THINGS of science, is a kit containing materials and instructions for making a model Gemini III capsule with a 12-inch Titan booster rocket and recovery parachute. It is launched by a rubber band.

Gemini, the United States' second manned space capsule design (Mercury was the first) and first two-man vehicle, was successfully guided into different directions in orbit on its third flight, the first with a crew aboard. This achievement, a first in space flight, is most important since spacecraft will have to be guided and maneuvered into position before space stations can be built and space vehicles may meet in space.

Spacecraft must also be able to return to earth at designated locations, and a step toward this achievement was made by Gemini, which was landed manually.

The first manned Gemini flight landed about 50 miles from the planned recovery area. U.S. spacecraft have been landing on water, while the Russian Vostoks and Voskhods have alighted on land.

Designs for Gemini included use of a paraglider. However, the first flight used parachutes proved in earlier Mercury flights. The Gemini model in the unit uses a parachute.

Extremely precise and complicated engineering and mathematics are required to construct a space vehicle so that it is maneuverable and can be directed exactly as desired.

To ensure the accuracy of the design, SCIENCE SERVICE cooperated with the Academy of Model Aeronautics in drawing plans for the model, and providing building and flying instructions.

A new THINGS of science unit is available each month. The rocket kit may be obtained for 75¢ each from SCIENCE SERVICE, 1719 N St., N.W., Washington, D.C. 20036.

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