

CHEMISTRY

Create Giant Cells With Heavy Water

► **HEAVY WATER** inhibits the normal division of living cells and allows them to grow to giant size.

The effect was observed first in plant cells. Subsequently it was found that deuterium, the heavy hydrogen that makes heavy water heavy, interferes with the reproductive capacity of mice and slightly inhibits ascites tumors in certain mice strains.

Dr. Melvin Calvin, University of California chemist, told scientists at the meeting of the American Chemical Society, New York Section, the effects are probably caused by changes in the size, shape and bonding of giant molecules of the living organism, brought about by the substitution of heavy hydrogen atoms for ordinary hydrogen atoms.

The effect was first noticed when Drs. O. Holm-Hansen and Vivian Moses grew chlor-*ella* in heavy water. In ordinary water heavy hydrogen is about one part in 5,000. When the percentage of heavy hydrogen was 33%, the cells grew to about ten times normal size, but failed to divide. After about six months, cells could be adapted so that they would divide even though the water contained 60% deuterium. Above that, adaptation was decreasingly efficient, and the capacity to divide ceased at about 95% deuterium.

Dr. Ann Hughes found all male mice fed on water containing 30% deuterium lost their ability to reproduce. In females the effect was less—up to 40% in some strains before conception was blocked. The effect was reversible when the mice were put back on ordinary water.

The results in mice suggest interference with cell division, since embryonic tissue is rapidly dividing.

The work suggests basic new studies of the structure and synthesis of the genetic material, nucleic acid, which is important in all growth and cell division.

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ENGINEERING

Pilot Safety Capsule Undergoing Tests

► A **SAFETY** cocoon designed to bring a pilot back to earth from extreme altitudes is now being tested.

The new device consists of a closed capsule and a system of parachutes, C. W. Russell, assistant project engineer at the Republic Aviation Corporation, Farmingdale, N.Y. told the American Society of Mechanical Engineers and the American Rocket Society meeting in New York.

At present, Mr. Russell said, several capsules that will get a pilot, who has abandoned his plane flying faster than the speed of sound and miles above the earth, home without exposing him to perilous hazards are under consideration. These include those capsules that consist of the entire pressurized cockpit, the whole front end of an air-

plane, a minimum-size seat capsule and a compromise version that houses pilot, seat and some control instruments.

One specific capsule now being tested works this way:

The pilot who wishes to bail out presses an ejection handle. A complicated series of devices then locks his shoulder harness into place and closes a sliding door to seal the pilot's capsule. The capsule is then blown down a set of rails and out of the bottom of the plane by two explosive charges. Machinery is set in motion to extend fins from the capsule to steady it during its fall, and finally, a series of parachutes are released so the capsule floats to earth.

Mr. Russell cautioned that many problems still face designers who want to "get a planeless pilot safely and painlessly back to earth."

"Again it must be emphasized," he said, "that there is no margin for error in the mechanisms utilized in this or any escape device. It may be called on to operate only once, but the report on how well it worked should be given by the pilot who has had to use it."

Science News Letter, March 29, 1958

CHEMISTRY

"Damage" Metals To Improve Them

► **MANY PROPERTIES** of metals can be improved by "damaging" them with nuclear reactor radiation, two former Atomic Energy Commission scientists told the Nuclear Engineering and Sciences Conference meeting in Chicago.

Seven non-fissionable metals, including stainless steel, nickel, titanium, copper and iron, were treated under various conditions with irradiation from three types of nuclear reactors by Dr. C. A. Bruch and W. E. McHugh at the Knolls Atomic Power Laboratory, Schenectady, N. Y.

The strength, hardness and electrical resistance of all the metals increased, the scientists reported. In each case there was a decrease in ductility, or the ease with which the metal could be drawn into a thin wire.

On the basis of their studies, the scientists have developed a picture of the radiation damage process, as changes caused by irradiation are called, which they hope will be applicable to other metals and to other conditions of radiation.

If their theory of radiation damage proves to be correct, it may be possible to speed up future studies of radiation damage.

The changes in properties or radiation damage in non-fissionable metals are due primarily to the scattering of neutrons by the metal atoms. "The two kinds which are important are the elastic and the inelastic scattering and these have different effects."

The view of the radiation damage process presented attempts to relate the data gathered during the experiments with existing theories, although the scientists cautioned that there may not yet be enough data for definite conclusions.

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IN SCIEN

ENDOCRINOLOGY

Height of Tall Girls Controlled by Hormones

► **EXTREME TALLNESS** in girls that results from excessive growth during puberty and adolescence may be curbed to a more normal development.

Dr. S. Charles Freed of the endocrinology clinic at Mount Zion Hospital in San Francisco reports in the *Journal of the American Medical Association* (March 15) the successful suppression of growth in two girls.

Excessive growth was stunted harmlessly by administering estrogen, a female hormone, to two young girls with extremely rapid bone growth.

One was, at the age of 12, five feet, four and one-half inches tall. The other was 11 and one-half, with a height of five feet, six and one-half inches.

Both indicated rapid average growth rate per year, Dr. Freed reports.

Within several months after the beginning of estrogen therapy, both girls' growth slowed considerably. No harmful effects resulted from the treatment.

Presumably, the growth suppression by estrogen is due to the action on the pituitary, a growth-determining gland, and action on the growth centers of the bones themselves, he explained.

A previous experiment which Dr. Freed and a colleague, Dr. M. B. Goldberg, also an endocrinologist at Mount Zion, recorded in 1948, showed stunted growth could be stimulated into increased growth by suppressing estrogen.

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METEOROLOGY

Weatherision Speeds Air Force Forecasts

► **THE LATEST** development in streamlining weather forecasting, weatherision, is now in use by the U. S. Air Force at Andrews Air Force Base, Washington, D. C.

It uses television to speed the dissemination of weather information to pilots and planners at this jet-age base, where fighter pilots stand ready to defend the nation's capital.

Weatherision allows one forecaster to service a number of customers at separate locations simultaneously. One forecaster, from his seat at the weatherision console, can provide complete scheduled briefing periods, answer requests for pilot briefings and pilot-to-forecaster service, keep the automatic telephone answering device up-to-the-minute, and monitor the weather radar scope.

The system has been found successful at four other Air Force bases where it is now in use.

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CE FIELDS

NAVIGATION

New Arctic Shipping Lanes Will Be Opened

► NEW SHIPPING routes in the Arctic Ocean will be opened up in the next few years, an English scientist has forecast, addressing the first international conference aimed at improving methods of predicting sea ice formation.

Dr. C. W. M. Swithinbank, research fellow at the Scott Polar Research Institute, Cambridge, England, reported results of his search through the logs of all ships traversing the Canadian Arctic region since 1900. From this information and studies of aerial photographs, he compiled an ice atlas of the North American Arctic.

Such an atlas can save "many millions" of dollars to United States shipping alone when new shipping routes are opened, Dr. Swithinbank told the Arctic Sea Ice Conference meeting at Easton, Md.

More than 80 scientists from nine countries, including four scientists from the U.S.S.R., attended the conference.

Dr. Swithinbank said the charts he had made, and also those of Dr. T. E. Armstrong of the Admiralty Hydrographic Department, London, were not designed to replace short-term ice forecasts made by the U. S. Navy Hydrographic Office. They are intended as a supplemental aid to mariners.

Eventual aim of scientists studying sea ice formation problems is to be able to make long-range forecasts. Before this is possible, however, the relationship between the earth's net heat gain in the equatorial regions and net heat loss in the polar regions, due to the sun's radiation, must be much more completely known than it is now.

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MEDICINE

Heart Patients Eat Radioactive Fat

► RESEARCH on heart patients who eat "meals" of radioactive fat indicates people with coronary artery disease have a metabolic error in their body chemistry.

This was reported by Dr. William Likoff and associates at the Albert Einstein Medical Center, Philadelphia, to the American Heart Association meeting in Chicago.

The new radioactive fat technique showed that the fat turnover in the body takes considerably longer in patients with known coronary artery disease than in normal subjects.

Four groups were given the radioactive fat meals. They included a normal, or control, group; patients with a high cholesterol blood level, some with and some without any evidence of coronary artery disease; and patients with normal blood cholesterol levels but with coronary artery disease.

With normal subjects, the blood was most radioactive within six hours after the meal, indicating the peak absorption of fat by the blood at that time.

Measurements of the radioactivity showed that 16% of the total amount of the fat eaten was in the blood. Twenty-four hours later less than five percent remained in the blood.

In contrast to this were the results in the three other groups. Peak radioactivity occurred later and indicated greater absorption of the fat. Much more was retained in the blood after 24 hours.

In these types of patients there seemed to be a similar "biochemical abnormality" after eating the radioactive fat meal.

As yet, however, no clearcut relationship has been established between the fats people eat and the clogging of arteries. Many factors probably play a part in causing this condition, Dr. Likoff said.

Co-authors of the report with Dr. Likoff were Drs. Donald Berkowitz, Asher Woldow and Gerson Jacobs.

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BIOCHEMISTRY

Fungi Spores May Have Chemical-Stopping Walls

► FUNGI SPORES may have a tough armor-plate-like wall that is capable of stopping chemical killers.

This is implied in a report on the effectiveness of fungicides, or fungi-killing chemical compounds, studied with radioactivity and described to the Nuclear Engineering and Science Conference meeting in Chicago.

A research team from the Battelle Memorial Institute, Columbus, Ohio, tried to learn why one chemical can kill fungi while a closely-related chemical compound is seemingly ineffective.

Using radioactive tracers, the scientists were able to draw this picture of what happens:

The less fungicidal compound loses its effectiveness by being stopped at the spore wall before it can carry on its lethal work beyond the wall. The more fungicidal compound, on the other hand, apparently is able to pierce the wall and to reach the cytoplasm where it exerts its deadly power.

However, the scientists explain that the radioactive tracer study of fungicidal action was too limited to be definitive.

They point out that "the factors which govern the fungicidal potency of chemical compounds are difficult to correlate with either their functionality or their physical properties."

The study was made to try to determine if some physical factor might not be involved in stopping a chemical from going about its deadly job in fungi spores.

"Preferential cell-wall adsorption, relating to unknown physical factors," they conclude, "may operate to limit the effectiveness of certain compounds which might otherwise be fungicidal."

The study was made by R. W. Greenlee, H. T. Kemp, R. S. Davidson and M. M. Baldwin of Battelle.

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CHEMISTRY

Flame Replaces Complex Process for Nuclear Fuel

► A TECHNIQUE that produces nuclear fuel rods better and faster than existing processes was revealed at the 1958 Nuclear Congress in Chicago.

The "novel" preparation method uses a high temperature flame furnace instead of the complex wet chemical, and sometimes physical, processes presently used to convert uranium compounds to usable uranium dioxide rods.

The main objective of converting uranyl nitrate or uranium trioxide to uranium dioxide is to achieve greater density. Scientists want to pack the greatest possible weight of fuel into the smallest possible volume.

Eventually, the method may be used to prepare solid rods of nuclear fuel directly from the starting materials without first going through a powder stage, C. D. Harrington and A. E. Ruehle, Mallinckrodt Chemical Works, St. Louis, reported.

The process involves feeding the starting material, uranium trioxide or uranyl nitrate, onto the top of some uranium dioxide fused in the hottest part of a hydrogen-methane flame or atomic hydrogen arc. The new material breaks down in the flame to form uranium oxide, which is stable at the very high temperature.

As feed material is added, a rod of crystalline uranium dioxide forms. The rod is continuously lowered by a drive mechanism such that the top end is always in the hottest part of the flame or arc.

The process was developed at the Atomic Energy Commission plant in St. Louis.

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EDUCATION

Only 16 U.S. High Schools Now Teaching Russian

► ONLY 16 high schools in the United States are now teaching the Russian language, according to Dr. Helen B. Jakobson, head of George Washington University's Slavic languages department.

Eight public and eight private high schools make up the 16, although several schools in South Dakota, Connecticut, California, Indiana, West Virginia, New Jersey, Wisconsin, and the District of Columbia are currently considering adding Russian courses to their curricula. Two New York City schools planned Russian courses to begin in March.

The report also shows that all except seven states have at least one college or university offering Russian.

By way of contrast, 5,000,000 to 6,000,000 Soviet students are reported to be studying English, and some 70 French secondary schools teach Russian three to four hours a day for five years.

Some of Dr. Jakobson's findings, together with those of Dr. Marjorie Johnston of the U.S. Office of Education, appear in the Office's publication, *School Life* (March).

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