

## GENERAL SCIENCE

# Slowness Wastes Billions

There is no adequate bridge for the critical gap between theoretical research and actual application, Dr. Bush charges in annual report of Carnegie Institution.

► **WORTH NOW** three billions of dollars a year, the development of hybrid corn was ten years late because "practical" men failed to appreciate and develop the fundamental work carried out about three decades ago by Dr. George H. Shull in the Carnegie Institution of Washington's genetics laboratory.

This was charged by Dr. Vannevar Bush, president of the Institution and war-time head of U. S. research, in his annual report.

"We have no effective organization in the country as a whole for bringing the fruits of disinterested research to the point where they invite industrial development," Dr. Bush warned.

The most critical bridging of the gap between theoretical research and application at the present time, Dr. Bush said, concerns how to cash in on the discoveries that the green algae *Chlorella* will produce 56% dry weight of protein, of which the world is very short for food purposes.

## North Pole Shifting

The North Pole will not stay put; it has shifted 12 feet in 30 years, to the perplexity of scientists.

But now Dr. E. H. Vestine of the Department of Terrestrial Magnetism of Carnegie Institution has hit upon the answer. From studies of the earth's magnetic field, Dr. Vestine said that the field has been drifting steadily westward, and that there is a corresponding westward movement of the upper layer of the earth's liquid core that accounts for it.

Besides this large westward drift, Dr. Vestine also found smaller crosswise drifts of the liquid core that exert a force on the earth's axis.

Dr. Vestine explains it this way: the North Pole acts like a spinning top. The irregular forces from the transverse drifts act like a finger pushing against the base of the top. When this is done, the upper part of the top will move in the opposite direction from the push. Thus when the drifting earth's core pushes against the earth's axis, the pole shifts its position to oppose the force.

The momentum, or "push" of these transverse movements is adequate to explain the year-to-year variations of the pole's position, said Dr. Vestine.

## Ages of Minerals

The atomic calendar, holding the key to the age of the earth, has revealed more of its secrets during the last year.

Improved methods of radioactivity dating, being worked out at the Institution, have led to the measuring of the oldest rock known so far to man. The lepidolite mineral in rock from Manitoba, Canada, was found to be 3,500 million, three and one-half billion, years old.

Other ancient minerals dated by rubidium-strontium radioactivity measurements were from rocks in: Bikita Quarry, Southern Rhodesia, 3,300 million; Jakkalswater, South Africa, 2,400 million; Ingersoll Mine, South Dakota, 2,100 million.

Drs. L. T. Aldrich and G. R. Tilton of the Department of Terrestrial Magnetism, and Dr. G. L. Davis and L. O. Nicolaysen of the Geophysical Laboratory, reporting their joint work, told of promising new techniques in radioactivity dating.

Finding the age of rocks by their radioactivity depends on the constant rate of break-down of radioactive materials into various decay products. Uranium 238, for instance, will, through billions of years, finally decay completely into a lead isotope. Age of the material, then, can be found by comparing the ratio of it to its end product in a rock.

Up until now, only rarely-found concentrated ores could be used in dating. But by the new techniques, very small quantities generally distributed through granite rock can be measured and the rock dated.

Where only one or perhaps two determinations could be run on a single rock sample before, now, using the latest methods, many different substances can be analyzed from the same sample—thorium, uranium, lead, rubidium, strontium and potassium—each a check on the other.

This is made possible by separation of very small amounts of isotopes with ion-exchange resin columns, and their accurate measurement by the isotope-dilution technique and the mass spectrometer.

The resin columns are able to extract the smallest amount of an isotope from a mass of crushed granite. This tiny bit of material, which could not be easily or accurately measured by itself, is added to a larger known quantity of the same isotope. The effects of this small addition are then comparatively easy to observe and measure with the mass spectrometer.

This new method will allow far more different rocks to be dated than before possible, because it is not restricted to highly concentrated ores. It will also allow more samples of a single rock structure to be taken, thus affording a check. Furthermore, it is believed that radioactive materials distributed generally in granite show fewer age discrepancies than materials from ores.

Most of the previous work has been done with uranium and its lead end-products. More emphasis is now profitably being



**LOADING URANIUM SLUGS**—Ten pounds of the precious fissionable material are being put into the holes of an atomic reactor at the Oak Ridge National Laboratory of the Atomic Energy Commission. Openings in the shield are round, but each channel in the graphite cube itself is diamond shaped, giving a passage for cooling air. From such an atomic power producer come radiations that are being used in a variety of promising ways.

placed on the rubidium-strontium method of dating ancient minerals.

The oldest rocks dated so far were found with the rubidium-strontium determination, using the isotope-dilution method of measuring.

### Galaxies in Collision

Ghosts of dead stars that exploded hundreds of years ago and galaxies of stars in collision are sending out such strong radio signals that they have been picked up here on earth.

During the past year three of the outstanding radio sources of the sky have been identified by Drs. Walter Baade and R. Minkowski of Mount Wilson and Palomar Observatories of the Carnegie Institution of Washington and the California Institute of Technology.

Radio signals from the constellation of Cassiopeia were found to come from the center of a remarkable emission nebula. This is believed to be the expanding envelope of what may have been a supernova of the remote past.

Another strong radio source, located at the Cavendish Laboratory in England, is in the constellation of Cygnus, the swan. This was found to coincide with a galaxy of billions of stars like our own Milky Way, but far beyond the system of stars to which our sun and the earth belong.

"This nebula is a very queer object," the annual report of the Carnegie Institution of Washington states. "In fact, its structure seems to make sense only if it is assumed that we are dealing with two nebulae which are in actual collision."

Another strong radio source seems to be a mass of peculiar glowing filaments of gases, spreading out from the center at varying speeds. Except for its small size, this object in the constellation of Puppis, the ship's stern, resembles the one in Cassiopeia.

Drs. Baade and Minkowski have been cooperating with the active radio research centers in Australia and England in attempting to spot astronomical objects that are broadcasting the cosmic radio noise picked up here on earth. One of the first objects identified with a radio source was the Crab nebula, remnant of a galactic supernova of 1054 A. D.

### Mutation Process Described

Heredity-controlling cell structures are only indirectly changed by mutation-causing agents (mutagens), Dr. M. Demerec, geneticist with the Institution, has discovered.

Dr. Demerec said various chemicals and ultraviolet radiation used to cause changes in genes, bearers of hereditary traits, affect the general metabolism of a cell primarily. The changes in the gene follow as a result of the metabolism change.

Dr. Demerec described the process of induced mutation like this: A mutagen acts upon the cell material, cytoplasm, to cause a change in the cell metabolism. This change in the cell "climate" then affects

the genes. Some of the genes are stable and do not react to the change, but others show some differences which then affect the hereditary structure of the cell.

Another discovery in genetics from Carnegie Institution of Washington laboratories was that increased heat seems to speed up the process of mutation. Geneticist Evelyn Witkin found that the one-celled organism, *Escherichia coli*, showed a greater rate of both spontaneous and induced mutations with an increase in temperature.

Dr. Barbara McClintock reported she found that the carriers of genes, chromosomes, also bear another functional genetic unit. This second unit controls the time and degree of action of the genes.

Science News Letter, December 20, 1952

### NUTRITION

## Average American Eats 12% More Than Pre-War

► THE AVERAGE American consumes 12% more food now than he did in pre-war years.

Furthermore, he is indulging his taste for more expensive kinds of foods, Dr. Frederick V. Waugh, agricultural economist, told the National Food and Nutrition Institute in Washington.

Although the average American eats more food now, he has not increased his intake of calories from the 1935-39 period. He eats less starchy material, about the same amount of vitamin A and a little more vitamin C. He gets considerably more riboflavin, thiamine, niacin, iron, protein and calcium now than in pre-war years.

In terms of food, the average American now eats fewer potatoes and grain products, but more meats, citrus fruits, tomatoes, leafy green and yellow vegetables.

Science News Letter, December 20, 1952

### GENERAL SCIENCE

## Temperature Inversions Cause "Flying Saucers"

► THE CIVIL Aeronautics Authority has now confirmed that the "flying saucers" seen on radar scopes at National Airport near Washington last July were the results of temperature inversions bending the radar waves. (See SNL, Aug. 9, p. 82.)

"Correlation of controllers' reports with Weather Bureau records indicated that a temperature inversion almost always existed when such targets appeared on the radar," the CAA said. The radar beams were bent downward by the inversions to give the operator a ground reflection on his radar scope. The inversion areas traveled with the speed of the wind, but horizontal movement of the areas produced a speed on the scope apparently twice as great as the wind speed.

The CAA report did not mention the lights seen occasionally along with the more numerous radar echoes. A spokesman said

this was because the lights did not interfere with traffic control at the airport, and were thus of little interest to CAA.

A meteorologist stated that, while the temperature inversion explanation for the radar echoes is quite reasonable, it would take quite terrific temperature inversions, which occur only rarely, to produce visual light reflections from the ground.

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Using radioactive tracers, scientists have found that a hormone-type weed-killer was carried throughout a bean plant's system in 30 minutes.

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