

CHEMISTRY

Fallout Measured Faster By New Chemical Method

➤ A NEW METHOD for rapid detection and measurement of hazardous fallout in milk was described by Miss Doris C. Sutton, a chemist with the U. S. Atomic Energy Commission, at the American Chemical Society meeting in New York.

The method, making use of a series of chemical techniques, has particular value for field testing in cases of accidental pollution from nuclear processes, she pointed out.

Long-term analysis has proved adequate for monitoring air, water and food materials for radioactive strontium (strontium-90) which is a known cause of leukemia and bone cancer, resulting from atomic testing.

"The increasing use of nuclear reactors as power sources, however, creates the possibility of accidental local contaminations many orders of magnitude greater than the fallout level," Miss Sutton explained. In such emergencies a rapid method for accurate measurement of strontium-90 in a variety of foodstuffs would be needed, "especially in milk," she said, adding that the rapid estimate of strontium-90 content in milk is a maximum value and is, therefore, suitable for emergency screening.

Using the new method, 20 samples of milk can be analyzed in four to five hours, as compared with the three or four weeks required for conventional analysis. Accuracy of the chemical detection and measurement has been confirmed through tests on 1960 milk, which agree with those previously obtained through conventional time-consuming methods.

The new method separates strontium-90 from other materials by means of a special acid (ethylenediaminetetraacetic acid or EDTA), which has the ability to attach itself to the strontium atoms. The radioactive strontium can then be measured by radiometric methods.

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TECHNOLOGY

New Film Developed To Filter Sea Water

➤ A MEMBRANE to filter the salt out of sea water has been developed at the University of California, Los Angeles. It is said to be 100 times more effective than previous commercial membranes.

The new and promising filter was developed by research engineers Sidney Loeb and Srinivasa Sourirajan. The membrane, or film, has a large number of tiny pores that in effect filter the salt water and separate the brine from the potable water.

To make their film, the UCLA engineers mix cellulose acetate with aqueous magnesium perchlorate solution and acetone, and then cast the sticky mixture cold on a glass plate.

After putting the glass plate into cold water, a film four thousandths of an inch thick is stripped from the plate and then shrunk slightly in hot water. The finished membrane, which can filter water 100 times faster than previous commercial films, is

mounted on each side of a porous steel disk.

Any number of disks are then stacked in a frame press, salt water is circulated through the unit at 1,500 pounds per square inch pressure, and the desalted water flows out from the bottom of the unit.

With their present film, Mr. Loeb and Mr. Sourirajan have been able to get potable water at the rate of eight gallons a day per square foot of membrane area. The potable water is produced in a single filtering from a brine containing a 5.25% salt concentration, which is much saltier than ordinary ocean water.

Mr. Loeb and Mr. Sourirajan believe that their process holds possibilities for future large-scale, commercial use, because the film is both cheap and durable, the equipment is simple and can run 24 hours a day without maintenance, and power requirements are as low as for any other desalination method.

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PUBLIC HEALTH

Milk Radioactivity Within Safety Levels

➤ LEVELS OF RADIOACTIVITY in milk reported on last month by the U. S. Public Health Service were within the level recommended as a guideline by the Federal Radiation Council.

The milk samples reported on were collected in March and April and were analyzed at Public Health Service laboratories for measurements of strontium-90 (a known cause of leukemia and bone cancer), cesium-137 and for calcium content. It takes about four months from the time samples are collected to complete a report.

Since March, 49 new milk monitoring points have been added to the ten previously in operation, bringing to 59 the total number of stations throughout the nation. Nineteen new stations are reporting for the first time in the PHS monthly technical publication "Radiological Health Data," Sept. 1960, along with the ten original stations.

The new milk stations are located from Hawaii to Alaska. The highest levels of strontium-90 were measured in milk from the New England area, but these were less than half the recommended concentration. The higher levels in this area are in keeping with the general pattern of fallout which tends to be higher in concentration in the northern part of the United States and Canada than elsewhere.

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TECHNOLOGY

Building Codes Allow Use Of More Plastics

➤ PRESENT BUILDING CODES permit the use of more plastics than are now used in building construction, a survey by the Southwest Research Institute, San Antonio, Tex., has shown. As the basis for a study of the relative fire-safety of plastic building products, the Institute has tabulated permissible uses of such components under major model codes.

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CHEMISTRY

Scientists Demonstrate Heat Control Over DNA

➤ HEAT CONTROL over the essential chemical of heredity in living cells, DNA, has been demonstrated by scientists of the Rockefeller Institute, it was reported to the American Chemical Society meeting in New York.

The precise, critical temperatures that will destroy an entire packet of genes, the bearers of heredity traits, have been found. Heat of slightly less can be used to knock out individual genes.

The research showing control of DNA, deoxyribonucleic acid, was done by Dr. Muriel Roger, assistant professor, and Dr. Rollin D. Hotchkiss, member and professor. DNA prepared from pneumococcus bacteria was used. The critical temperature destroys all the genes in a single DNA molecule, while at a sub-critical point, individual genes that carry hereditary characteristics are knocked out.

The influence of the heat is to destroy the helical structure of DNA, which is believed to consist of two long strands of atoms, wound into a circular, twisting configuration.

The temperatures involved range from about 185 to 198 degrees Fahrenheit. It takes only a few minutes for the higher temperatures to inactivate DNA, whereas the selective destruction of genes takes place after a lag of about two hours.

It is hoped that the new methods can be used to make a rough structural map, partly chemical and partly physical, to plot the various genes and linkage groups that have such control and determination over the stream of life.

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PUBLIC HEALTH

Preventing Ills of Aged Is Lifelong Process

➤ OLD PEOPLE must be protected from the three D's—disease, disability and dependency. And prevention of these ill does not begin at 65; it is a lifelong process, Dr. Claire F. Ryder of the division of special health services, Department of Health, Education and Welfare, told the National Recreation Congress in Washington, D. C.

How the older person will utilize the increasing amounts of leisure time at his disposal, Dr. Ryder said, will depend on his own and his family's attitudes, the community's attitudes, his preparation for retirement, his own basic resources, his financial and living conditions and his physical condition.

Proper use of leisure time is a preventive to help forestall the onset of dependency. And recreation can be a bridge between the young and the old.

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CE FIELDS

BIOLOGY

Missing Enzyme Found In Chloroplasts

➤ A MISSING ENZYME necessary for photosynthesis has been found in the chloroplasts of spinach, pea, barley and fern leaves as well as in algae. Robert Smillie, biologist of Brookhaven National Laboratory, Upton, N. Y., reports his discovery of the missing enzyme in *Nature*, Sept. 17, 1960.

The conversion of carbon dioxide to carbohydrates by the process of photosynthesis requires an enzyme that cuts off the phosphate group from the number one carbon atom of certain carbohydrate derivatives.

Although this enzyme has been found previously in other plant tissues, it has not been found before in the chloroplasts which are essential to the photosynthetic process. The enzyme is known as alkaline fructose-1,6-diphosphatase.

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ARCHAEOLOGY

Ancient Silver Cup Puzzles Scientists

➤ THE RESTORATION of a corrosion-encrusted silver cup made with pride by some unknown silversmith over 3,000 years ago raised a problem that is puzzling scientists. The cup was buried in the ground of Enkomi in the island of Cyprus, where it lay hidden until modern times.

The problem concerns the decoration on the cup. As a result of laboratory work, the decoration was first reported to be an inlay of a substance called niello. Niello is a mixture of the sulfides of silver and copper and is the basis of jewelry that has been made for many hundreds of years by a very tricky process handed down from father to son in Siam (Thailand) and other parts of southeast Asia.

The Enkomi cup is dated 1,400 B.C. If the niello decoration was used in Cyprus at that early date, it is a discovery of great importance to archaeologists.

But Drs. G. F. Claringbull and A. A. Moss of the department of mineralogy of the British Museum in London report they believe that the evidence suggesting the decoration might be niello is not conclusive. They believe the cup was inlaid with copper.

When first excavated, the cup was covered with green corrosion products. Preliminary examination showed the presence of gold and a black powdery substance. When the black powder was analyzed spectrographically, the results indicated that it might be niello.

The next problem was how to remove the corrosion results of some 3,000 years in the ground without destroying either the gold or the niello. Laboratory experiments with niello showed that it would resist

being soaked in hot formic acid. The hot acid was therefore used to wash off the incrustation. Beneath, "the original decoration was revealed in a surprisingly fresh condition."

Dr. Harold J. Plenderleith of the International Centre for the Study of the Preservation and Restoration of Cultural Property in Rome explains why he feels the Enkomi cup was decorated in niello: The perfection of line and luster survived immersion for 20 minutes in commercial formic acid at boiling temperature without any sign of loss. The black patterns were "lustrous or splendid and enamel-like" and, where undamaged by time and the soil, the material formed a perfect tracery of shiny jet-black mass-and-line ornament in the bright silver groundwork.

The latest arguments over the cup appear in the British scientific journal *Nature*, Sept., 1960.

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MEDICINE

More Autopsies Needed To Find Causes of Death

➤ MORE AUTOPSIES should be performed if accurate studies are to be made of the causes of death from heart disease.

Reporting a ten-year study in the *Journal of the American Medical Association*, 174:384, 1960, Drs. David M. Spain and Victoria A. Bradess, with Charles Mohr, all of Brooklyn, N. Y., emphasize the importance of increased accuracy in studies being made of atherosclerotic heart disease. They report findings on autopsies performed on 1,329 men and women over 30 years of age in Westchester County, New York.

Coronary artery disease (atherosclerosis) caused 91% of the sudden deaths of 463 white men in Westchester County, who died within an hour after symptoms began. The study shows that only 52%, or 32 of 66 white women died of this cause.

The researchers show that in any community the relative frequency of the various causes of sudden death will depend on the definition of sudden death used by the physician.

The proper interpretation of the cause of death in sudden, unexplained and unexpected fatalities in adults, they say, has assumed added significance in view of the many geographical, population and other studies being made in connection with atherosclerotic heart disease.

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AERONAUTICS

Jet Noise Tells Thrust And Adds to Safety

➤ THE NOISE from a jet plane can do more than wake up a neighborhood. It can indicate the thrust of the jet engine.

A new jet thrust indicator developed by the Industrial Acoustics Company, Inc., in New York, uses this "sound" principle to provide added safety as a take-off monitor and added economy as an in-flight fuel economizer.

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BIOCHEMISTRY

Lung Cancer Triggered By Chemical Reaction

➤ A CONTRIBUTING CAUSE of lung cancer may be a chemical reaction or "defense" triggered by the introduction to the body of foreign substances. Dr. Andrew L. Reeves, biochemist at Wayne State University's department of industrial medicine and hygiene, made this report to the American Chemical Society meeting in New York.

Cancer-causing agents, found in cigarette smoke, auto exhaust and city air-pollution, injected into the windpipes of rats, provoked an immediate response in the animals' natural defense mechanisms against foreign body invasion. Scavenger cells accumulated at the site of deposition.

In about six weeks, most of the injected chemicals were cleared out of the lungs, the biochemist said. This clearing process was accompanied by temporary changes in certain chemical balances within the cells of the lung tissue.

This "response" did not altogether subside when the lungs were clear of injected matter. Some of the chemical changes continued to show up in later specimens of tissue, and to an increased extent. In this "chronic phase," Dr. Reeves, said, some cell constituents were increased which also are increased in full-grown cancer.

The absence of the cancer-provoking substance at this time seems to indicate that the cause and effect relationship between exposure and cancer growth is certainly not a direct one, Dr. Reeves emphasized.

Dr. Reeves was assisted in his research by Dr. Arthur J. Vorwald, director of the Wayne State Laboratory, and Mrs. Dolores B. Dibley, a research technician at the University.

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MEDICINE

Stomach Acid Secretion Studied in Animals

➤ ANIMAL EXPERIMENTS are giving doctors a better understanding of the mechanism that initiates secretion of stomach acid.

Dr. Morton I. Grossman of the University of California Medical School is conducting such experiments in his laboratory at the Los Angeles Veterans Administration Center.

It has long been known that the stomach starts secreting acid in response to distention of the stomach by food. This distention causes release of the hormone gastrin by the pyloric glands located at the bottom of the stomach. The hormone in turn initiates release of acid by the stomach.

Dr. Grossman has found that even when the pyloric glands are removed from experimental animals, distention of the stomach will still initiate secretion of stomach acid. This suggests an additional mechanism may be involved in stomach acid secretion.

Nervous impulses traveling to and from the stomach by way of the vagus nerve may initiate acid release independently of the pyloric glands.

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