

## PUBLIC HEALTH

## Radioactive Milk Cleansed, Peril Eased

► THE NUCLEAR FALLOUT problem has been eliminated from milk, possibly heralding the beginning of other developments to eliminate this danger.

The U.S. Public Health Service has announced the last scheduled commercial-scale test run of a process that has proved capable of removing more than 90% of radioactive strontium from milk. Tests have been run at the Producers Creamery Company, Lebanon, Mo., since June 1964 under a contract supported jointly by the U.S. Department of Agriculture and the Department of Health, Education and Welfare.

During each eight-hour test run, the process, called ion-exchange, has removed more than 90% of both strontium 90 and strontium 89 from 100,000 pounds of whole milk.

The process filters slightly acidified milk through columns of resin that have been charged with mineral salts similar in composition to the salts found in the milk. The positively charged radioactive strontium changes places with elements in the resin. The milk, freed of most of the radioactive strontium, has its excess acidity neutralized and is then pasteurized and homogenized as usual. The resulting milk has acceptable flavor and meets bacteriological standards.

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## GEOLOGY

## Infrared 'Maps' Spot Fresh Water

► A NEW METHOD of finding fresh water with infrared light is being developed by airborne geologists with the U.S. Geological Survey, Department of the Interior.

By using special infrared equipment flown over the Virgin Islands and Puerto Rico, scientists can locate hidden spots where fresh water is seeping into the salty seas, explained Joseph T. Callahan, associate chief with the Survey's water research division.

Infrared "mapping" depends upon differences of heat radiating from the area to be surveyed, as compared with regular photographic mapping, which uses differences of light, Mr. Callahan said.

In other words, the infrared map looks somewhat like a photographic map where the warmer areas show up as light tones and cold areas are dark.

Thus, cold spring water seeping into warm ocean waters shows up as a dark patch or streak in a light area. Water from submarine springs, which are warmer than the ocean, shows up as light patches.

Flying in an especially instrumented aircraft at altitudes of from 150 to 500 feet, Mr. Callahan was accompanied by mathematician H. E. Sibitzke and hydrologist Russell Brown, both with the Geological Survey in Phoenix, Ariz., where the photographs will be processed and analyzed.

Possibilities of the new technique were

first noticed last year when the "hot spots" of Kilauea volcano on Hawaii were mapped with infrared equipment, Mr. Callahan said. Not only did the films show temperature differences of volcanic heat, but also temperature differences as ground water was discharged into the bay.

Infrared instruments can be calibrated to record sensitivities of one one-thousandth of a degree Fahrenheit. The instruments used last week over the islands were set to detect differences of one degree F—the ocean being about 76 to 78 degrees F, while the fresh waters are a few degrees cooler.

Fresh water is scarce in the Virgin Islands and has to be brought in barges or converted from sea water. In Puerto Rico, the drainage from sink holes along the north coast may be as much as 480 million gallons a day, much of which seeps into the ocean through limestone caverns.

By using infrared equipment to find the exact locations of where the fresh water discharges into the sea, scientists can trace the fresh water sources back into the land and drill wells for this valuable supply.

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## BIOCHEMISTRY

## New Evidence Reported On Origin of Life

► NEW EVIDENCE suggests that the earliest beginnings of life, pre-life compounds, were formed on a wet, primitive earth at room temperature.

Under exactly such conditions a young scientist was able recently to bind together amino acids, which, when linked together in sufficient numbers, form proteins.

Gary Steinman, graduate student at Lawrence Radiation Laboratory and working with Nobelist Dr. Melvin Calvin, told SCIENCE SERVICE that the agent dicyandiamide (DCDA) formed a peptide bond between the amino acid molecules when the entire system was dissolved in water.

He said that these bonds suggest a means by which many of the compounds necessary for life first appeared on the primitive earth. The young researcher said he and his co-workers have also bonded successfully fatty acids and glycerols to form lipids, and phosphoric acids and sugars to form sugar phosphates. Both are types of compounds that also had to be present on the early earth for life to form.

However, he said the bonding under dilute conditions in the presence of water may only have been one of many processes of creation of life on earth and that several could have been at work at the same time, perhaps in different locations.

This work, to be published in Science, was reported by Dr. Calvin as part of his talk on chemical evolution at a symposium of the Biophysical Society meeting in San Francisco.

He also reported that another researcher working on his team, Ted Belsky, has found organic molecules, closely related to the green pigment chlorophyll in plants, in rock from the Soudan iron formation in Minnesota, known to be 2.5 billion years old.

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## SPACE

## Finding Life on Mars May Depend on Season

► IF MAN is to detect any microscopic forms of life that may exist on Mars, he will have to pick the right time of year—the Martian year.

Determining the most favorable "season" is only one of the problems involved in finding life on other planets. Based on the scant information available, and without even knowing what forms of life to look for, scientists are faced with selecting the most likely locations for life to occur on a strange planet.

Besides the problems of getting a spacecraft to the planet and returning the data to earth, there are three main considerations connected with the detection of life, said Theodore Sall of Radio Corporation of America's astro-electronics division, Princeton, N.J.

First, the planet itself must be considered, including the best location and time of year.

Next, an evaluation of the life-detection equipment is necessary. The machinery must be foolproof; there must be no way for inanimate material to appear to be living to the sensors.

This is particularly important, because the finding of life on other worlds would be one of the most important scientific discoveries in history.

The third consideration, Mr. Sall said in a paper prepared for the New York Academy of Sciences' conference on Civilian and Military Uses of Aerospace in New York, is the method of deploying life-detection devices. Two of the ideas under consideration are the use of several vehicles with only one or two detectors each, or a single larger craft with a number of different integrated devices.

The detection devices have to do more than just collect samples, Mr. Sall noted. They must monitor any biological events that take place and telemeter this information back to earth.

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## ENTOMOLOGY

## Insecticide in Salt Kills Cow Flies

► WHEN RONNEL insecticide is mixed with mineral salt and set out in the pasture, cattle that lick it rid themselves of 95% of heel flies and blood-sucking horn flies. These insects rank as some of the worst pests of cattle in the United States.

This simple method of controlling the damaging pests was devised by scientists of the Georgia Agricultural Experiment Station and of Agricultural Research Service, part of the U.S. Department of Agriculture.

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# CE FIELDS

## PALEONTOLOGY

### Most Ancient Life Found in Canada

► SMALL STAR-LIKE organisms and thread-like forms with tiny branches may have been living nearly 2,000 million years ago—at a time when the planet earth was only half as old as it is today.

Twelve new species of the most ancient organisms ever known have been described by Drs. Elso S. Barghoorn, curator of the Botanical Museum at Harvard University, and the late Dr. Stanley A. Tyler, formerly of the University of Wisconsin.

The discovery of these very old fossils on the Gunflint iron range of the northern Lake Superior region of Canada and adjacent Minnesota, supports the view that widespread and abundant biological activity was going on at an earlier age than scientists had been able to find, the professors reported in *Science*, 147:563, 1965.

The ancient organisms had many and varied shapes. Some were unbranched filaments with thick cross walls separating cells of different dimensions. Others were star-like with filaments radiating outward, while others were egg-shaped with a tiny opening at the narrow end.

The structure and shape of these creatures are similar to those of the thread-like blue-green algae that exist today, the scientists said.

The Gunflint sediments, or chert, as flint-like rock is called, in which the fossils were found is about 2,000 million years old, from the lower third of the Middle Precambrian Age.

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## PHYSICS

### European Tests Show 'Backwardness' of Time

► TIME HAS ONLY one direction of flow under certain conditions, 10 European scientists showed in an experiment using the world's second largest atom smasher, the CERN accelerator in Geneva.

Until some eight months ago, scientists had thought their theories would hold true whether time ran backward or forward. Now they have additional experimental evidence that this is not necessarily so.

The European experiments make it clear that one theory, called the fifth force, suggested to explain the one-way street for time, is not valid. The fifth force is 10 thousand million times weaker than the force of gravitation, which is the weakest of the four known forces.

When tests at Brookhaven National Laboratory, Upton, N.Y., showed that time sometimes could have only one direction of flow, a fifth force was proposed as an explanation. (See *SNL*, 86:99, Aug. 15, 1964)

Proof of the non-existence of this fifth force means that the symmetry law known as "CP invariance" does not always apply in the strange world of the atomic nucleus, as scientists had until recently thought it did. This proof also means that "time reversal invariance" is equally not always applicable.

Time reversal reverses time in the same sense that a motion picture can be projected backward. Previously, the same physical laws were believed to apply whether the film was projected forward or backward.

The European tests on the break-up of K-mesons confirm that the situation with respect to time is now the same as it once was for parity, or handedness.

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## TECHNOLOGY

### Atom-Seeing Microscope To Be Built at Cornell

► AN ELECTRON MICROSCOPE so powerful it can be used for direct observation of atoms within proteins and viruses is scheduled to be built at Cornell University, Ithaca, N.Y. The project to develop and construct an electron microscope that will operate at the highest possible resolution is being financed by the National Science Foundation. Dr. Benjamin M. Siegel of Cornell is director of the project.

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## MEDICINE

### Heavy Particles Could Bombard Disease Tissue

► FUTURE TREATMENT of cancer tumors will probably combine the high energy atomic particles beamed out by cyclotrons and nuclear accelerators with the older X-ray treatment.

Dr. J. J. Hazel of the University of California, Berkeley, where researchers over the past ten years have studied the results of heavy particle beams on patients with cancer and other diseases, predicted the treatment at a radiology meeting in Toronto.

By treating a tumor first with conventional radiation to cause as much shrinkage as possible, Dr. Hazel said, doctors could go on to give treatment with heavy particle radiation that would reach the deeper recesses of the tumor.

Tumors most likely to benefit from this combined treatment would probably be to those of the head and neck.

The high energy particles are different from X-rays and gamma rays, Dr. Hazel explained. They are actually made up of parts of the atom's nucleus, such as neutrons, protons, mesons, as well as the nucleus itself stripped of its electrons.

"They have great depths of penetration with little side scatter," Dr. Hazel said. They act on cancer tissue by ionizing it into charged particles or by colliding with other nuclei and breaking them up into fragments.

Dr. Hazel spoke at the combined annual meetings of the Canadian Association of Radiologists and the Canadian Association of Physicists.

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## PSYCHOLOGY

### Marital Quarrels Involve Psychological Survival

► "THE BATTLE for psychological survival is at the heart of every marital quarrel, no matter what else the quarrel is about," a pamphlet published by the Public Affairs Committee reported.

For some people, the battle begins in childhood and continues throughout life.

"We may grow up and become adult, and go about the business of assuming responsibility, of working, loving, protecting, giving—and still retain, within, the hurt, angry child who never grows up and never gives up his lifelong battle," said author Harry Milt, public relations director for the National Association for Mental Health.

It is this fight for love, recognition, consideration and respect that stems from childhood experiences which often triggers quarrel after quarrel.

This hurt, defensive, child-like attitude that causes adults to become frightened and enraged can account for people loving and protecting each other, and yet quarreling, fighting and even hating each other at the same time, Mr. Milt pointed out.

"It explains, too, why so many married people feel unloved and unrespected, even in the midst of admiration and love."

The booklet, entitled *What Can You Do About Quarreling?*, suggests that the best time to stop a quarrel is before it begins.

Quarreling, according to Mr. Milt, goes a great deal deeper than an argument, and involves much more than surface irritation.

Mr. Milt said that if a husband or wife becomes aware of the other's increased tendency "to be 'hurt' or 'offended,'" to see some harmful meaning or significance behind some ordinary, insignificant incident," he or she should take responsibility to sidestep or sidetrack an unpleasant encounter.

However, if the encounter cannot be avoided, the person should listen to the complaint or accusation, and try to "calm the raging battle."

"The important thing is time—time. Do whatever you can to gain time for the disturbed state of mind to settle down and anxieties to disappear," Mr. Milt recommended.

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## GEOGRAPHY

### Antarctic Coast Line Thousand Miles Longer

► THE ANTARCTIC coast line is 18,648 miles long, about 1,000 miles more than had been estimated previously, two Soviet geographers have calculated.

Until this new study, the shore line of the Sixth Continent was thought to stretch about 17,428 miles. The calculations were made by Vladimir Bardin and Inna Suyetova, using the latest aerial survey data, as well as large scale maps. A report on the new value for the perimeter of Antarctica appears in *Soviet-Bloc Research in Geophysics, Astronomy and Space*, a publication of the U.S. Department of Commerce.

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