SCIENCE NEWS

Science Service, Washington, D. C.

COSMIC RAYS

A NEW hypothesis involving cosmic rays in the origin and evolution of life on earth has been suggested by Dr. John Tandberg, of the Electrolux Laboratories in Stockholm. His suggestion goes much farther back in evolution than does the hypothesis of Darwin and other well-known concepts on the possible origins of life.

Dr. Tandberg suggests that the powerful and piercing cosmic rays, and the radiations from radium that were formerly much more potent on the earth, are the agents which brought forth life on earth. These rays turned aseptic organic molecules into strange, new forms of matter that could combine, eventually, to make those compounds out of which protein and other life-giving substances are composed. Life in animal and human form is characterized by the presence of compounds containing atoms of carbon and nitrogen.

In the waters of the oceans, in the primitive, lifeless world, the necessary complex compounds could have been built up, it is suggested on the basis of the new hypothesis.

The ocean's water at that time, Dr. Tandberg postulates, contained the heavy kind of hydrogen known as deuterium just as it does now. If this deuterium were bombarded with cosmic rays, or with the radiation released by radium in the ocean, there would be created those non-electrical particles of matter known as neutrons. With neutrons to go around knocking other atoms or molecules, Dr. Tandberg sets the stage for chemical evolution that might have led to complex organic molecules containing nitrogen and carbon. Suppose, he assumes, there existed in the ocean a molecule of carbon atoms arranged in a typical chain-like fashion. If one of the carbon atoms in this chain were struck by a neutron a nuclear change could be brought about which would create a stable atom of nitrogen in place of the struck carbon. Thus the chain would contain many carbon atoms and a nitrogen atom. Providing the chain molecule was not destroyed by this bombardment a new carbon-nitrogen linkage would thus have been built up. The new molecule, formed in this way, would be capable of new reactions which it did not before possess.

By the bombardment of silicon with neutrons it is possible, according to Dr. Tandberg, to create the essential element phosphorus also needed for life.

The evolution of more and more complicated molecules by bombardment would, of course, be a matter of chance but eventually—through the millions of years of the earth's existence—a happy combination of complicated molecules may have been brought about which would have eventually led to the first primitive forms of life on the earth.

Dr. Tandberg concludes: "Thus various complicated organic molecules containing, for example, carbon-nitrogen may have originated in a way rather different from ordinary chemical reactions and will perhaps have influenced the evolution of organic matter, eventually leading to the first primitive forms of living matter, no longer present on earth."

THE 200-INCH TELESCOPE MIRROR

THE great 200-inch telescope mirror for the Mount Palomar Observatory passed through a crucial stage when Dr. John Anderson looked it over with the delicate knife-edge test capable of detecting imperfections of a millionth of an inch.

Object of the test, which gave promising results, was to determine whether the huge polishing tool, which is large enough to cover the entire mirror, could do the job of turning the coarsely ground spherically curved disc into a highly polished one. This is one of the essential steps toward making out of the huge piece of special optical glass a mirror whose reflecting surface is in the shape of a parabola, necessary to bring the light from stars to focus.

Scientists charged with making the great mirror also had to know whether the 200-inch mirror and the huge polishing tool could be handled in the different grinding positions. It was determined that this can also be done satisfactorily.

The test for the mirror's spherical exactness was carried out by playing a point of light 110 feet from the face of the mirror, where the center of the complete sphere would be, and observing whether the mirror reflected the light right back to the center of the imaginary sphere. Any portion which failed to do so was not of the proper spherical shape, and unless it was very small would have to be worked over with polishing rouge until it was correct to a millionth of an inch. After the mirror has the proper spherical shape it will be used to test a 120-inch flat mirror, which will be utilized in figuring the spherical shape into a parabola.

RIVER IN THE SUBMERGED GRAND CANYON OF THE PACIFIC COAST

THE Pacific Coast's submerged Grand Canyon has a swift river that flows along its bottom, Professor Francis P. Shepard, of the University of Illinois, reported upon his return from an exploration of its course for 30 miles, off the shore from Monterey. Professor Shepard's present headquarters are at the Scripps Institution of Oceanography, University of California.

The great submarine canyon, which goes to depths of 6,000 feet and is actually contoured like the Grand Canyon of Arizona, causes a river-like flow by capturing and channeling ocean tides. This discovery was made through the use of a current meter. The tidal current scours it clean of mud.

The small amount of mud left in its bottom, as well as its other structural features, were studied by means of a new core-taking device invented by R. S. Dietz and K. O. Emery, with a special nose trap designed by Professor Shepard. The device consists of 600-pound streamlined weights, with a twenty-foot pipe and a friction-reducing nose. It drops to the bottom at a rate of thirteen miles an hour, and is capable of bringing up samples as deep as its length. The longest core brought up thus far, however, is twelve feet.

Bottom samples thus obtained show that there is a very thin layer of mud on the bottom of the canyon, underlain by deeper strata of sand, rounded gravel, or rock. The water-worn gravel was probably formed when the canyon was a terrestrial river bed.

One wall of the outer canyon, where it resembles the Grand Canyon of Arizona, is formed of granite, overlain by sedimentary rocks of Tertiary age. The Tertiary was the long Age of Mammals, that ended with the coming of the Pleistocene or Ice Age a million years ago. Although the existence of the Monterey Canyon has been known for forty years, it is only now being explored in detail by Professor Shepard and his co-workers.

TAGGED IRON ATOMS

CURRENT theories about how the body uses iron for blood-building have been upset by studies with radioactive iron atoms, Professor George H. Whipple, of the Rochester, N. Y., University School of Medicine, reported at the Duke University symposium on medical problems.

Professor Whipple shared in a Nobel Prize award for his studies which led to discovery of the liver cure for pernicious anemia.

Liver still stands at the head of the list of foods that promote the building of hemoglobin and red blood cells in anemia, Professor Whipple said. He showed how this was learned from studies in which newly-formed blood and hemoglobin can be measured week by week in anemic dogs and the amount formed accurately determined as related to any given article of diet. After liver, kidney and other meat products stand high on the list of blood-building foods, whereas vegetables and dairy products stand low. Describing his latest studies with the tagged iron atoms, produced by the atom-smashing cyclotron of Professor E. O. Lawrence, of the University of California, Professor Whipple said: "The use of this precious material shows that many of our beliefs about iron absorption and utilization are incorrect. The anemic dog absorbs iron readily whereas the non-anemic dog, whose iron stores are adequate, absorbs very little if any demonstrable iron. The difference as shown by the use of radioactive iron is quite striking."

The way iron is transported in the body, long in dispute, will probably be cleared up by the use of radioactive iron atoms. Such atoms, because of their radioactivity, can easily be located anywhere in the body and their course through the body, along with untagged iron atoms normally taken into the body, can be detected. Within the first few hours after radioactive iron is given by mouth it is carried in the blood plasma in the non-protein part. Protein substances, more familiar as meat and eggs, are a necessity for the formation of hemoglobin, red coloring matter of the blood which carries life-essential oxygen through the body. Within a few hours the radioactive iron begins to appear in the protein fraction of the red blood cells. Whether this is associated with hemoglobin can not as yet be said.

VITAMIN B

"WHAT to do about vitamin B?" is a question making life harder for nutrition experts.

At the opening session of the American Dietetic Association at Milwaukee the vitamin B Complex—and it is complex—was put plainly before America's diet planners by Dr. C. A. Elvehjem, of the University of Wisconsin.

No less than six factors contained in vitamin B and all given tentative names and health functions were listed by Dr. Elvehjem, who said the splitting up of this vitamin has been figuratively like the explosion of a giant firecracker under it, leaving the scientists to pick up the bits.

One "bit" is riboflavin, which has been associated mainly with growth, but it is now gaining recognition as a factor against nerve degeneration. This particular part of vitamin B may be what is lacking when the nerves of beriberi sufferers are affected. Apparently, also, severe deficiency of this factor underlies cataracts rats get from nutrition deficiency.

Nicotinic acid, another of the "bits," is believed to be the main factor in vitamin B that figures—by its absence—in pellagra. Other food deficiencies may play a part in this disease, but "it does appear that the majority of the classical symptoms of pellagra respond to nicotinic acid."

Since, by one estimate, there are a million people in the United States whose food does not protect them against pellagra, Dr. Elvehjem added, "It is obvious that something should be done."

Whether millions of Americans should make up such deficiencies in vitamin factors at the grocery store or the drug store is a question on which dietitians must take a stand, pointing out that synthetic vitamins that can be taken like pills are here and clinicians find them valuable in many instances. At wholesale prices the cost of a daily requirement of riboflavin is four cents, nicotinic acid a tenth of a cent, thiamin one cent. "Personally," he added, "I prefer to consume my daily requirement of thiamin in the form of a pork chop, my riboflavin as a glass or two of milk, and by nicotinic acid as a small piece of liver. However, this does not mean that foods should not be fortified with some of the above compounds under certain conditions."

THE STABLE FLY AS A POSSIBLE CARRIER OF THE VIRUS OF INFANTILE PARALYSIS

STABLE flies and other biting insects should be reinvestigated as possible carriers of the virus that causes infantile paralysis, in the opinion of Dr. L. L. Lumsden, U. S. Public Health Service. Dr. Lumsden has been giving a series of lectures at the University of California at Berkeley.

Much work has been done on this theory in the past, but the theory was discarded because no vector of any kind has been shown to be capable of carrying the virus of the disease.

Dr. Lumsden contends that the essential causative factors of infantile paralysis are unknown and that work should be done to determine the possibility of a combination of biting insects as vectors, or carriers, and of lower animals as reservoirs of the infection. "Reports of recent observations and experiments by workers at the Univer-

sity of Bern, Switzerland, "Dr. Lumsden said, "appear to strengthen the suspicion that bovine and also porcine animals may serve at times as reservoirs."

The facts on which the theory of an insect carrier of the disease is based are that more cases of the disease occur in rural areas, proportionately speaking, and that it usually occurs at the season when infectious diseases like typhoid fever, yellow fever and malaria, in which insects play a part as carriers, are most numerous.

The fact that the disease in its epidemic form tends to confine itself to certain areas has called for much speculation regarding local causative factors, Dr. Lumsden said. Undoubtedly many humans in these areas who might be considered as carriers have traveled to other points without spreading the disease.

In some of the earlier studies, it was pointed out, scientists were able to transmit a form of the disease to monkeys from the stable fly, but these cases were so few that the fly theory was finally discarded as untenable.

ITEMS

OUT of super-heavy elements, created alone in the laboratories of science and not found naturally on the earth, comes a new radioactive transformation of matter never before known. By bombarding the heaviest element, uranium, for months with the atomic particles known as neutrons, the German physical chemists Drs. O. Hahn, L. Meitner and F. Strassmann, of the Kaiser Wilhelm Institute for Chemistry in Berlin-Dahlem have succeeded in creating the new transformation out of element No. 95, called eka-iridium. The eka-iridium, it is found, breaks down with a transformation having a half-life period of 60 days. It is believed that the bombardment of uranium by neutrons makes the latter penetrate into the uranium atoms and builds up elements, heavier than uranium (No. 92) which exist for only brief periods of time. In this way artificially-created atoms probably up to atomic number No. 97 have been created. The German report appears in *Naturwissenschaften.*

IF salmon were as constantly visible as robins or bluebirds, they would be as celebrated for their skill in building nests and their vigilance and valor in defending them, it appears from a study reported to the Smithsonian Institution by Dr. Leonard P. Schultz, curator of fishes in the U. S. National Museum. The female of the salmon species does all the nest building. She is very skilful in the way she lets the water carry away the sand and gravel she scoops up with sidewise scrapings of her body, leaving a saucer-like depression in the bottom. After she has deposited part of her eggs and the male has fertilized them, she covers them over with gravel and then scoops out another nest immediately upstream. Some of the gravel from the second digging helps to protect the first nest. Both male and female fish guard the nest.

A NEW instrument, the adaptometer, which detects night blindness within eight minutes, has been developed by Dr. J. B. Feldman, of Philadelphia. Night blindness, believed responsible for many of the thousands of fatal automobile accidents that occur after dark, is an inability of the eye to adapt itself to dim light. It can generally be remedied by intensive dosing with vitamin A or by a diet rich in the food sources of this vitamin, such as dairy products, green vegetables and carrots. Exposure to glare or strong light bleaches out the visual purple, a substance in the retina of the eye necessary for sight. When sufficient vitamin A is present, the visual purple is regenerated and the individual can see again. The adaptometer measures the speed of this regeneration. For normal persons it does not exceed five minutes. Any more than that indicates the presence of night blindness. The person being tested fixes his eyes on a strong light in the upper part of the adaptometer. After three minutes this bright light is turned off and the person is apparently in darkness. However, a very weak test light is automatically turned on when the bright light is switched off. If the person can not see this weak light within five minutes, he has night blindness.

WPA WORKERS, engaged in almost every conceivable type of activity, are being employed in New York City to work out highly complex mathematical tables of importance not only to mathematicians but to all sciences dependent upon mathematics. They have already completed computation of the value of the function e^x at intervals of .00001 for x ranging between -2.5 and 2.5 and are working on other tables as well under the direction of Dr. Arnold N. Lowan of Brooklyn College. The work is of an essential type, but of such a large order that no individual scientist is ordinarily capable of its execution. Sponsor of the project is Dr. Lyman T. Briggs, director of the National Bureau of Standards.

THE first "light conditioned" railroad car in the United States, equipped with Polaroid variable density windows, has been placed in service on the Union Pacific Railroad's "City of Los Angeles," a streamliner. Passengers in the car, fitted out as an observation car, can now control the brightness of light coming through the window by turning a knob. Only one of the two "City of Los Angeles" units is thus far equipped with the car. The windows are made of a polarizing material, which cuts out light vibrating in one plane. By rotating the Polaroid 90 degrees all the light can be cut out, with varying amounts in between depending upon the amount of turn.

SUCCESSFUL development of a tiny radio tube whose possible applications include mechanical "ears" for the deaf that are four times as sensitive as present types and police and foot soldier radio receiving sets has been announced by the Hytronic Laboratories at Salem, Mass., after two years of research. Developed primarily for the construction of an improved hearing aid, the miniature tubes are one and five eighths inches long and nine sixteenths of an inch in diameter. Hair-like filaments, small grids and other parts correspondingly small make the use of magnifying lenses necessary during manufacture. The tubes operate from a small battery no larger than flashlight cells. It can be incorporated into a hearing aid no longer than four inches. Operating on a filament voltage of 1.4 volts, the tiny tubes have a drain of .070 amperes. The tubes are made in a triode, tetrode, input pentode and output pentode.