

PHYSICS

Rare Atoms Studied

See Front Cover

➤ ACCURATE MEASUREMENTS made for the first time on beams of rare, fragile atoms promise to play a vital role in enabling scientists to communicate with projected earth satellites.

The new information learned about the light-absorbing properties and life span of the rare atoms was described by Dr. Lewis Branscomb of the National Bureau of Standards.

The measurements, obtained on the properties of negatively charged atoms of hydrogen and oxygen, are also expected to have important consequences for atomic energy, guided missiles, astrophysics, chemistry and shortwave communications.

Results of the research were disclosed by Dr. Branscomb, chief of the atomic physics section of the Bureau, when some of the 40 winners of the nation-wide Science Talent Search sponsored by SCIENCE SERVICE and financed by the Westinghouse Educational Foundation toured the Bureau facilities.

They are shown in the photograph on the cover of this week's SCIENCE NEWS LETTER with Dr. J. J. Diamond, a chemist in the Bureau's mineral products division. He is explaining operation of the high temperature kiln used for testing new ceramic materials.

Dr. Branscomb, in explaining his studies, said that until recently, "scientists held little hope for accurately measuring these scarce negative atoms (or ions) in the laboratory."

"However, the subject has been studied in recent years in great theoretical detail be-

cause it seems to be important in understanding the absorption of light at the surface of the sun. The same processes also play an important role in the upper atmosphere where short radio waves are reflected back to earth, making possible long distance communications."

The upper atmosphere consists of layers of charged particles that make long distance communication possible, Dr. Branscomb explained. These layers shift and vary for reasons not now clear.

It is believed that knowledge of the negatively charged atoms, which are part of these shifting layers, will help scientists predict the behavior of radio waves. Such predictions, according to Dr. Branscomb, should be vitally important in communicating with guided missiles, man-made satellites, and with other nations.

Dr. Branscomb explained that, under ordinary conditions, negatively charged atoms are extremely rare. Most atoms are electrically neutral or positive. In ordinary air, there is only one negative ion for every ten million billion normal atoms.

"So far, our results have established that the electron affinity of oxygen is now 1.48 instead of 2.2," Dr. Branscomb said.

"This change substantially affects the amount of the negative oxygen ion in many equilibrium processes at high temperatures.

"Since concentrations of these ions affect the properties of gases in which they are present, our findings will be useful in studying and perfecting the performance of such devices as rocket and jet engine motors."

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of Medicine, St. Louis. It was reported at the hearings by Dr. Watt as one of the studies supported by grants from the National Heart Institute.

A significance of the finding lies in the fact that pyridoxine plays a part in the body's handling of fats. Civilized man's diets are high in fats that may overload a pyridoxine enzyme system. Cooking and processing of foods results in substantial losses of pyridoxine.

The combination of these two facts plus some others, such as exposure to abnormal trace metals, may explain in part the development of atherosclerosis.

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• RADIO

Saturday, March 17, 1956, 2:05-2:15 p.m. EST
"Adventures in Science" with Watson Davis, director of Science Service over the CBS Radio Network. Check your local CBS Station.

Ernest Swift, executive director, National Wildlife Federation, Washington, D. C., will discuss "Our Endangered Wildlife."

BIOLOGY

Earthworm Can Learn to Turn in Right Direction

➤ AN EARTHWORM can not only turn but can be taught to turn in the right direction.

This is demonstrated by teaching earthworms to find their way through a simple maze. It is not only possible to teach them to take the right turn, but Dr. Rodabe P. Bharucha-Reid of the University of California found that allowing the worms to get acquainted with the maze for 20 hours before the training started cut learning time from an average of 43 lessons to only 22. The earthworm study is reported in *Science* (Feb. 10)

This indicates the lowly earthworm is capable of what psychologists call "latent memory," or the storing of impressions until a later time when they may be useful.

The earthworm maze was constructed of glass tubing in the form of a "T." At the end of the left arm of the crossbar, very rough sandpaper was placed. This was the worm's punishment for taking the wrong turn. The sandpaper was followed by electrodes that gave the worm a very slight electric shock.

At the end of the right turn, the worm encountered a glass beaker filled with moist earth and moss. The beaker was covered with paper to reduce the light—just what an earthworm could ask as a reward.

Dr. Bharucha-Reid selected the earthworm for this study because, in order to "understand the functional relationship that exists between a complex nervous system and its environment, we must start by obtaining information about the behavior of nervous systems belonging to simpler organisms."

Darwin was the first to ascribe "some degree of intelligence" to the earthworm.

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MEDICINE

Stop Artery Hardening

➤ PREVENTION of hardening of the arteries, the nation's biggest disease killer through the heart disease it causes, may come through addition to our daily foods of some inexpensive, harmless chemical, perhaps a vitamin.

This is foreseen in statements by Dr. James A. Shannon, director of the National Institutes of Health, and Dr. James Watt, director of the National Heart Institute, Bethesda, Md.

The body's handling of fat is now considered the crux of the problem of coronary disease. Although much remains to be learned, Dr. Shannon is hopeful that it may be possible in the future to influence the body's handling, or metabolism, of fat "much as we influence the metabolism of other foodstuff by simple food additives. Such an ability might eventually be utilized for the prevention of disease."

Arteriosclerosis begins in the early thirties, although its effects may not be rec-

ognized until the fifties, Dr. Shannon pointed out at House appropriation subcommittee hearings.

"The only way we can conceive of having a chance to deal with arteriosclerosis," he said, "is by the development of an agent which can be added to the food and which can be taken year in and year out over long periods of time."

The drugs that will eventually be developed to handle or to prevent arteriosclerosis will be very different from those now used, Dr. Shannon predicted.

"They will be more in the category of vitamins," he declared.

Basis, at least in part, for this comes from the discovery that sustained or intermittent deficiency of one B vitamin, known as pyridoxine, will induce the most serious artery hardening, known as atherosclerosis, in monkeys.

This finding was made by Dr. Henry A. Schroeder of Washington University School