

ment of Science in St. Louis, by the Jesuit Seismological Association.

Each shell is named for the seismologist who first described it; ribbons lead from the various layers to samples of minerals illustrating the kind of stuff they are made of. All the familiar rocks of the earth's surface crust occupy a space not much thicker, proportionately, than a rather heavy coat of paint.

Science News Letter, February 8, 1936

ZOOLOGY

Unusual Obituary Tells of Death of Oldest Chimpanzee

UNUSUAL among obituary notices is one published in *Science* (Jan. 31), telling of the death of the oldest chimpanzee in captivity. Jimmy, aged about 40 years, died on Nov. 28 in the Philadelphia Zoological Garden.

Michael I. Tomilin, who had Jimmy in charge and who writes his death notice, believes he died of "old age." Jimmy came to the Philadelphia Zoo in 1931 from the late Mme. Rosalina Abreau's private primate colony in Havana, with the reputation of being a "tough customer." At Philadelphia he gradually became quite manageable, and during the last months of his life, evidently due to senility, he was gentle.

Yale University's Psycho-Biological Department was willed Jimmy's body by Mme. Abreau, and as a result science expects to have new information about old age in one of man's relatives.

Science News Letter, February 8, 1936

RADIO

Tiny Radio Sets Help Handle Long Freight Trains

LOW-powered radio transmitters are being used experimentally on at least one eastern railroad for communication between locomotive and caboose on long freight trains, it was disclosed in New York City recently by S. G. Ellis before the meeting of the American Institute of Electrical Engineers.

Tests covering 18 months' time, 36,000 miles of travel and with the radio in operation for a total of 1,800 hours were described by Mr. Ellis of the Westinghouse Electric Company. The tests were made on the New York, New Haven and Hartford Railroad.

The transmitter used had only 15 watts power and a range of only a few miles. Tests were satisfactory for freight trains of 130 cars in length.

Science News Letter, February 8, 1936

PHYSICS

First Synthesis of Naturally Found Radioactive Substance

Radium E Built Up by Bombarding Bismuth With Heavy Hydrogen Particles at 12,000-Mile-an-Hour Velocity

MAN HAS at last been able to make a radioactive substance that occurs in nature.

By powerful bombardments of a common substance there has been created synthetically in the radiation laboratory of the University of California a form of radium.

This first synthetic production of any naturally occurring radioactive substance is the accomplishment of Dr. J. J. Livingood, research associate.

The substance which he has created for the first time by artificial laboratory methods is radium E, one of the intermediary products in the slow decay of ordinary radium to lead. The amount of radium E so far obtained is almost infinitesimal, but careful checks leave no doubt as to its identity.

Synthetic radium E was obtained by Dr. Livingood through the bombardment of the common, inert substance bismuth with deuterons at an energy of approximately five and a half million electron volts.

This product behaves exactly as does natural radium E. Tests have shown that it decays with a half-life of five days by emitting electrons and is converted into polonium which continues the decay by emitting alpha particles at a half-life rate of about one hundred forty days. The end product of this process is lead, though tests so far have been limited to determining the type and rate of radiation.

This new step in the transmutation of matter was taken in the laboratory of Prof. E. O. Lawrence, using the eighty-five ton cyclotron or atomic disintegrator designed by him which has already been successful in transmuted more than a third of all elements known to man.

The conversion of bismuth, heaviest nonradioactive element, into radium E, is considered final proof that the apparatus will induce changes in every kind of matter. The deuteron bullets used in bombarding substances to be transmuted are the nuclei of double-weight hydrogen atoms obtained from heavy water costing approximately \$600 a pint.

These bullets are shot from the cyclotron at velocities of twelve thousand or more miles per second at the rate of one hundred thousand billion per second. Substances placed in the path of this barrage are disintegrated or fundamentally changed in nature. Recently platinum was converted into gold.

Seventeen different research centers throughout the world have reported that they are building or planning to build replicas of the atom disintegrator at the University of California. Three of the centers are in Russia, two in England, one in Japan, one in Denmark, and ten in the United States, namely the Universities of Michigan, Chicago, Rochester, Washington, Illinois, Cornell, Princeton, Purdue, Columbia, and the Franklin Institute.

Science News Letter, February 8, 1936

CHEMISTRY

Onions' "Breath" Measured For Strength by New Method

ONIONS can now have the strength of their "breath" measured.

Stated in slightly more technical terms, a definitely quantitative measurement can be made of their pungency, by a new distillation process devised by Hans Platenius, a young research scientist at Cornell University. Mr. Platenius's technique is no mere chemical stunt, either; anyone who has ever bought or sold onions in quantity knows that strength or mildness in onions is reflected in cold cash on the hard cobblestones of the produce marketplace.

The Cornell onion-"breath" measuring system is based on the fact that the pungency of an onion depends on a sulphur-containing oil. There is very little of this in an onion. One mass analysis some years ago used up more than five tons of onions and yielded less than half a pound of the oil. But it goes a long way.

The oil, which is known chemically as allyl-propyl-disulphide, contains about 43 per cent. of sulphur by weight. Hence, any method which will measure

the amount of sulphur that can be evaporated out of a given lot of onions should give an indirect measurement of the quantity of the oniony oil present, and hence of the strength of the onions' "breath."

This is just what Mr. Platenius's method does. He steams off the vaporizable sulphur from the sample of onions under

analysis, and then by suitable chemical means precipitates out the sulphur so that it can be weighed. The method is rather slow, so that it is not recommended for routine analysis, but it offers the first accurate quantitative estimate of the relative strengths of different lots of onions to replace the human nose.

Science News Letter, February 8, 1936

PHYSICS

Method of Striking Key Has no Effect on Tone

DESPITE statements of eminent pianists to the contrary, the tone produced by striking a given key on a piano is the same no matter in what manner the key is struck. Ignace Paderewski is the notable exception among the musicians who cling to the idea that in some manner the way the key is struck influences tone.

New research on this question, which has been a bone of contention between physicists and musicians for years, was presented before the Franklin Institute by Prof. Charles Weyl of the University of Pennsylvania's school of electrical engineering.

Principal demonstration of Prof. Weyl was a giant model of the action of a grand piano consisting of one key, one hammer and one string. With it he was able to show that after striking the key a musician has no more control over the tone than a marksman has over a bullet after he has pressed the trigger of his gun.

According to musicians' views, tone and loudness are separate factors controlled by the manner of depressing the piano keys. Scientists claim that both tone and loudness are determined simultaneously by the piano key. Only the velocity of the hammer at the instant of striking the string is determined by the key. And the same tone and loudness can be produced by any method which would yield the same velocity of impact.

Prof. Weyl showed a "mechanical pianist" in a mechanism which produced more accurately and repeatedly a given tone than any pianist could do. "In fact," said Prof. Weyl, "the device is able to produce many more gradations of tone than the most competent pianist, no matter how great his technique."

The mechanical pianist also demonstrated for the audience gradations of tone so small that no ear could detect

them; yet they were visible on an oscillograph.

Another demonstration with a mechanical striker indicated that the same tone could be produced by three different methods of striking a piano key, corresponding to three different methods of human touch.

"The evidence offered," said Prof. Weyl, "indicates that eminent pianists were unable to detect tone differences five times as great as were detected by the oscillograph equipment. They were also unable to detect the difference between mechanically produced tones and those produced by a pianist.

"My report," Prof. Weyl added, "serves to prove the entirely mechanical nature of the piano as a musical instrument when considered from the point of view of the interdependence of tone and loudness, and also the ineffectuality from the tonal point of view of difference in touch."

Science News Letter, February 8, 1936

BIOLOGY

Disease Virus Identified As Non-Living Substance

NON-LIVING crystals of definite chemical composition, like the protein in our food, assume the guilt for causing disease hitherto attributed only to living germs, as a result of fresh scientific evidence unearthed by Drs. W. M. Stanley and H. S. Loring of the Rockefeller Institute for Medical Research laboratories at Princeton, N. J. (*Science*, Jan. 25.)

From sick tomato plants, suffering from mosaic disease, the scientists isolated crystals of a protein substance that has the same chemical, physical and biological properties as the protein crystals they previously found guilty of causing mosaic disease in tobacco plants. (See *SNL*, July 20, 1935)

The newly-discovered evidence is of wide importance. It relates to the problem of viruses, such as cause both the mosaic disease of plants, and various human diseases like infantile paralysis. Scientists have thought that these viruses were living organisms, although so small that they cannot be seen under the microscope and pass through the pores of the finest porcelain filters.

Dr. Stanley's investigations show that the cause of this one "virus disease," tobacco mosaic, is not a living substance but a non-living chemical. It may be that the agents which cause other virus diseases are also non-living chemical substances. If this proves to be the case, it will provide an entirely new line of attack on a large group of diseases that afflict animals and man.

Science News Letter, February 8, 1936

BIOLOGY

Evolutionary Changes Found In Virus of Tobacco Mosaic

EEVOLUTIONARY changes occurring in something that is not really alive constitute a paradox arising out of the discovery, by H. H. McKinney of the U. S. Department of Agriculture, that one form of a mosaic disease of plants can change, or "mutate," into another form.

Thus, the ordinary type of tobacco mosaic often mutates into a yellow type, which can be propagated as a continuous pure strain. Similarly, a virus disease of wheat mutates from a green to a yellow form. Other changes of like nature in virus diseases have been observed by Mr. McKinney.

These viruses are among the most puzzling of things with which biologists have to deal. They can pass through the pores of fine porcelain filters, and cannot be seen under the microscope. They cause diseases and at the same time propagate themselves very much as though they were living micro-organisms; yet in other respects they behave as though they were simply non-living chemical substances.

Recently an investigator on the staff of the Rockefeller Institute, Dr. W. M. Stanley, has produced non-living crystals of a protein substance that can cause mosaic disease in tobacco, and which appears to be the virus itself.

If this substance really is the virus, and it really is not alive, we have in Mr. McKinney's mutation observations a most puzzling state of affairs—a biological process taking place in a non-living thing.

Science News Letter, February 8, 1936