

and only those atomic reactions making both tubes conducting simultaneously are recorded.

Coincidence counting was used by Prof. Bothe and the late Dr. Hans Geiger to establish that cosmic rays observe the prin-

ciple of energy conservation. Some physicists in 1925 thought that energy was not conserved in the individual scattering process, but only as the average for many such processes.

Science News Letter, November 13, 1954

PHYSICS

Experiments Explained

By PROF. W. BOTHE

► Our experiments show that energy is gained if any alpha particle is shot into the beryllium nucleus. That is to say, by addition of an alpha particle to the beryllium nucleus, a carbon nucleus of atomic weight 13 is produced which contains less energy than the two original nuclei together.

These experiments give a hint as to the way in which the building up of the atom nuclei actually takes place in the universe: The heavier nuclei are produced by steps from the lighter.

The hypothesis which Dr. Robert A. Millikan has made to explain the "ultra-rays" (cosmic rays), that the heavy nuclei are formed direct by the sudden combination of a great number of protons and electrons, is accordingly very improbable.

In still another connection the gamma radiation from beryllium is of interest in connection with the problem of the cosmic rays. The new rays are much harder than the known radioactive gamma rays, their penetrating power approaches close to that of the softest components of the cosmic rays.

Thus in the beryllium rays one can study the properties of a gamma radiation which has approximately the penetrating power

of the cosmic rays. As is well known, my earlier experiments with Prof. Werner Kolhorster (see SNL, Feb. 1, 1930, p. 76) showed that the properties of the cosmic rays are very different from those of a gamma radiation, and that the cosmic rays behave rather as a corpuscular radiation.

Dr. H. Becker and I have now carried out the same experiments with the gamma rays from beryllium; it turns out that these still behave completely like a normal gamma radiation and quite differently from the cosmic rays.

This is further strong support for the idea that the cosmic rays have a particle-like nature in the lower layers of the atmosphere.

A series of other light elements, as well as beryllium, can be artificially excited to gamma ray emission. The production of artificial gamma rays is just as general a phenomenon as the breaking up of atomic nuclei.

In this radiation we have a means of studying the structure of the lighter atomic nuclei; we are standing at the threshold of a "nuclear spectroscopy."

Indeed the light atom nuclei are of special interest.

(Reprinted from SNL, March 12, 1932, p. 159.)

Science News Letter, November 13, 1954

PARASITOLOGY

Amebic Partnership

► AMEBAS, THE germs that cause amebic dysentery, cannot survive, much less cause dysentery, without the aid of other, smaller microorganisms.

This discovery, made with the aid of germ-free guinea pigs reared at the LOBUND Institute of the University of Notre Dame, Ind., was reported by Bruce P. Phillips, medical protozoologist of the U. S. National Institutes of Health, Bethesda, Md., at the meeting of the American Society of Parasitologists with the American Society of Tropical Medicine and Hygiene in Memphis.

Associated with Mr. Phillips in the research were: Drs. W. H. Wright and C. W. Rees, also of the National Institutes of Health, and Miss P. A. Wolfe and Drs. H. A. Gordon and J. A. Reyniers of the University of Notre Dame.

Germ-free guinea pigs and conventional guinea pigs that harbor the common intestinal bacteria were used in the experi-

ments. Both groups were inoculated with bacteria-free amebas.

The scientists reported that none of the 35 germ-free animals developed amebic dysentery, where 34 of the 37 conventional animals came down with the disease, and the remaining three were shown to harbor the infecting agent when sacrificed.

In another experiment, two series of germ-free animals were fed respectively with single species of two common intestinal bacteria, *Escherichia coli* and *Aerobacter aerogenes*, prior to inoculation with bacteria-free amebas. All of these animals also developed acute amebic disease with typical lesions.

These findings supply concrete evidence for the first time that bacteria have a role in the experimental production of disease by the agent of amebic dysentery. Whether this relationship involves more than two species of bacteria is not yet known.

The results also suggest that the value of

certain broad spectrum antibiotics in the treatment of amebic dysentery may be largely related to their activity against associated bacteria.

The possibility that another organism, not yet identified, may act as an antagonist to the ameba will be investigated in future studies. Existence of such an agent might explain why some individuals who never show symptoms of amebic dysentery are nevertheless carriers of the ameba.

Science News Letter, November 13, 1954

The average Frenchman drinks 40 gallons of red, white and pink *wine* a year.

More than 8,000,000 lightning strokes, on the average, strike the earth in one day.

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