SCIENCE NEWS

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CANCER FOLLOWING GERM INJECTION

DEVELOPMENT of cancer following the injection of a germ or micro-organism is announced by the U. S. Public Health Service's National Institute of Health. The discovery was made by Drs. T. J. Glover and J. L. Engle, who have been working at the institute, although they are not attached to the regular government staff nor to the U. S. Public Health Service. They have succeeded in producing typical, unmistakable cancer in a guinea-pig. This cancer followed the injection of a culture of a micro-organism or germ isolated from the tissues of a proved case of cancer of the human breast. This traverses the prevalent opinion that cancer is not a germ disease. It is only after years of work that the announcement has been made.

Application of the new discovery to the treatment of human cancer is far in the future, but the experiments of Drs. Glover and Engle promise to blaze a new line of cancer research that appears very hopeful. "It promises to open a valuable field for further research," commented Dr. George W. McCoy, director of the institute.

Drs. Glover and Engle have found that cancer in rats follows injection of their culture of germs from human cancerous tissue. But rats develop cancer so very easily that this was not considered convincing evidence that the germ culture actually could cause cancer. The production of cancer in guinea-pigs, which, so far as any one knows or can find out, do not readily develop it, is considered much more of a feat and more convincing that the germ culture of Drs. Glover and Engle is cancer-producing.

The cancer produced in the guinea-pig has all the characteristic appearance of cancer when examined by the unaided eye and under the microscope. Furthermore it spread, producing cancer in other parts of the body, thus fulfilling another of the criteria for the diagnosis of the growth as cancer. The germ itself is what scientists call a spore-bearer. It was isolated on special media from the tissues of the human cancer.

In the report only one case of cancer in the guinea-pig is described. The diagnosis of cancer in this case was confirmed by a pathologist of the National Institute of Health, and the foremost staff bacteriologist is now checking the bacteriological side of the work.

Dr. Glover started his investigations several years ago in New York. For the last three years, the work has been carried on by him and by Dr. Engle at the National Institute of Health where the director and staff scientists could follow and check various steps of the research.

In their report they do not claim specifically to have discovered the cause of cancer, but state with characteristic scientific reserve: "It is the purpose of this report to place on record the production of metastatic malignancy in one of a group of guinea-pigs inoculated with a culture containing a spore-bearing micro-organism which was isolated on special media from the tissue of a microscopically proven carcinoma of the human breast."

Further points to be determined are whether the micro-organism they have described causes the cancer, or whether it is caused by some virus or other germ present in the culture or by some toxin or other substance produced by the bacteria of the culture. It is possible that this culture is not the cause of all types of cancer, but of one group of them. Efforts to develop a serum, either curative or protective, will be a logical outcome of this research. Investigation of the infectiousness of a type of cancer produced by bacteria as this one was in the guinea-pig will also have to be developed.

One of the two physicians making the discovery is from New York, while the second is from Philadelphia. They had worked under private research grants for about ten years before bringing their experiments to the National Institute of Health for critical testing.

COSMIC RAYS

COSMIC rays are streams of particles or corpuscles, not electro-magnetic waves like light, x-rays or radium's gamma rays, Professor Bruno Rossi, leading Italian physicist, has concluded from experiments at the University of Padova's Institute of Physics. He finds that cosmic radiation observed at sea-level is exclusively a corpuscular radiation. From his experiments he also concludes that the primary cosmic radiation which reaches us from outer space is, in all probability, also a corpuscular radiation. In this conclusion Professor Rossi agrees closely with Dr. Arthur H. Compton and other experimenters in America who have found evidence that cosmic rays are particles, perhaps electrons.

Professor Rossi is now organizing a cosmic radiation expedition to Africa. Experiments will be made in the neighborhood of the magnetic equator with the purpose of testing his theories of how the magnetic field of the earth affects the cosmic corpuscles. On this expedition he will make tests similar to those that were a part of the world-wide surveys under the direction of Dr. Arthur H. Compton, of the University of Chicago.

"I have approached the problem of the nature of the primary cosmic radiation from the theoretical as well as from the experimental point of view," Professor Rossi said in an exclusive statement to Science Service. He is investigating the theoretical as well as the experimental evidence of the influence of the earth's magnetic field upon cosmic rays if they are corpuscles. He has already solved this problem theoretically in its general outlines.

"Since 1930 I have been devoting myself to an accurate study of certain corpuscles of very high energy, the ultra-penetrating corpuscles, which Drs. Bothe and Kolhörster, the German physicists, demonstrated as present in the atmosphere," Professor Rossi said. "The scope of this research is to study the properties of such corpuscles and their effect upon matter as well as to determine their relation to cosmic radiation—to determine whether they are generated in the atmosphere by a primary cosmic radiation of the type of gamma rays

or whether they consist of the primary cosmic radiation itself.

"To this end I have carried out an accurate and extensive comparison of the absorption of complex cosmic radiation with the absorption of corpuscular radiation, following the trajectory of the corpuscles through layers of lead up to a thickness of one meter by means of a recording device which notes each corpuscle as it enters and leaves the absorbing medium. I have not found any difference between the two absorptions.

"So far as concerns the effects produced by the corpuscles of the radiation when they penetrate matter, I have been able to demonstrate by means of a system of coincidental impulses of three recording instruments that the trajectories of these corpuscles fork at certain distances. This indicates that the divisions originate in the material traversed by secondary corpuscles. I have studied the properties of the secondary corpuscles in relation to the means by which they are generated and I have shown that to them are due all those anomalies in the absorption curve which have previously been designated as the 'transition effects.'"

ENERGY TURNED INTO MASS FOR FIRST TIME IN HISTORY

FOR the first time, physicists seem to have discovered a case of energy turning into mass, that is, non-material "push and shove" being converted into something material that can be weighed, as it were. Dr. Kenneth T. Bainbridge, fellow of the Franklin Institute's Bartol Research Foundation and authority on the masses of atoms, has concluded that when lithium is bombarded with the heart of a helium atom, energy may be converted into mass.

The experiments were first made by Mme. Irene Curie-Joliot, daughter of the discoverers of radium, and her husband, Dr. F. Joliot, at the Institut de Radium in Paris last year. Dr. Bainbridge examined the experiments in detail and finds that when a lithium atom of mass seven is hit by and captures an alpha particle, or helium atom heart, there is strong indication of the transfer of kinetic energy of the impinging alpha particle into what the physicists call "inertial mass." This creates an atom of boron of mass ten. This isotope of boron is found as one of the experimental products of lithium's disintegration.

"Change of energy into inertial mass must be viewed with caution," Dr. Bainbridge said in a Franklin Institute lecture, "but available experimental data make the suggestion the most plausible of four possible explanations."

While this is the first apparent case of energy being converted into mass, many cases of the changing of mass into energy are known. The transforming of mass of atoms into heat and light is a favorite mechanism for explaining how the sun and stars keep shining for billions upon billions of years.

The scientific value of disintegration and other nuclear experiments far surpasses the highly speculative economic values of release of energy from the atom, in Dr. Bainbridge's opinion. Following in the footsteps of Dr. F. W. Aston, the British physicist, who developed the mass-spectrograph to separate chemically identical isotopes and deal with them individually, Dr. Bainbridge has carried on mass-spectrograph studies at the Bartol Research Foundation.

"The spectrograph permits the investigator to determine what nuclear types exist," Dr. Bainbridge explained. "It is possible to determine the relative abundance of the isotopes of specific elements and so indirectly the chemical atomic weights and finally to make measurements of the masses of atoms to an accuracy of one part in 30,000. These measurements are important in connection with studies of the disintegration of atomic nuclei.

"The results of atomic mass measurements in cooperation with disintegration experiments furnish an experimental proof of the equivalence of mass and energy deduced theoretically by Einstein. The best example of this is given by the experiments of Cockcroft and Walton on the disintegration of the lithium seven nucleus by the capture of an incident proton resulting in the release of two helium nuclei with a combined energy of about 17,000,000 electron volts, which energy must be the result of a transformation of mass into energy."

ITEMS

REITERATION that cosmic rays are probably electrons or other electric particles coming to earth from outer space and being deflected by the earth's magnetic field in such a way that the intensity is greater for high latitudes than near the equator is contained in a detailed report by Dr. Arthur H. Compton, of the University of Chicago, which appears in the *Physical Review*. Summarizing the researches of more than sixty physicists in a geographical study of cosmic rays throughout the world, Dr. Compton finds that at sea level the cosmic ray intensity at high latitudes is 14 per cent. greater than at the equator, at 2,000 meters (a little over a mile) it is 22 per cent. greater, and at 4,360 meters (over two miles high) it is 33 per cent. greater. Dr. Compton writes: "Consideration of the conditions necessary for deflection of high-speed electrified particles by the earth's magnetic field indicates that if the cosmic rays are electrons, they must originate not less than several hundred kilometers above the earth." He finds that his data can be quantitatively explained on the basis of the Lemaitre-Vallarta theory of electrons approaching the earth from remote space.

TESTING the hearing of chimpanzees was the rather novel task of a psychologist described by J. H. Elder, of Yale University, to the recent meeting of the New York Branch of the American Psychological Association. Chimpanzees are no harder to test accurately than are human children, Mr. Elder reported. His method was to train the apes to press a key when the signal was given and not to press it when they heard nothing. Standard earphones were used and the apes were then allowed to listen to sounds of known frequency from an audiometer. The frequencies heard by the chimpanzees are within the range audible to human beings, although several of the apes could hear frequencies lower than those heard by the average human being.