SCIENCE NEWS

Science Service, Washington, D. C.

HEAVY ELECTRONS

THE name of Professor Arthur H. Compton, physicist of the University of Chicago, now appears in the friendly controversy over whether "heavy" electrons can exist in the radiation emitted from the radioactive element known as radium E.

In the current issue of the *Physical Review*, Professor Compton analyzes the experimental results obtained by Professor G. E. M. Jauncey, of Washington University, St. Louis. Professor Jauncey has interpreted the particular beta ray (electron) images he obtained on his photographic plates as indicating electrons having a mass three times as great as the mass of an ordinary electron. Thus these special electrons have been called "heavy." By calculations based on the size and shape of the apparatus of Professor Jauncey, Professor Compton reports that a single spurious reflection of the beta rays off one surface of the apparatus could explain the particular images whose appearance is explained by saying "heavy" electrons produced them. If such reflections occur, ordinary electrons and not "heavy" ones could produce the results observed.

The whole subject of "heavy" particles from radium E has been the topic of numerous technical communications to the magazine for some months, by many scientific men. The subject has been in the news of physical science since the "heavy," or X, particle was detected in cosmic radiation by Drs. Carl Anderson and Seth Neddermeyer more than a year ago. No one has seriously challenged the idea that in the enormous energy range found in cosmic rays there may exist "heavy" electrons having masses hundreds of times the normal. But there are many physicists who can find many reasons for not accepting, at the present time, this same idea for particles emitted in the lower energy range of radioactive radiation. Definite conclusions, for or against the existence of low energy "heavy" electrons, will come when the various investigators agree on experimental evidence; a point which has not yet been reached in the present early stage of the controversy.

THE MAGNETISM OF THE EARTH

DR. M. A. TUVE, of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, in a recent address, stated that a clue or perhaps a new and unknown principle of physics which can explain the large magnetism of the earth and the far vaster magnetism of the sun is still being sought.

For ten years the department, under the leadership of Dr. J. A. Fleming, has searched for the answer to the baffling question whose solution would make clearer the rôle played by the earth's magnetic field in man's daily life; a rôle which affects radio, wire communication, cosmic ray intensity, the amount of ultra-violet light striking the earth and many other factors in man's existence. On their ten-year research march toward this goal Dr. Tuve and his colleagues, Dr. L. R. Hafstad and Dr. N. P. Heydenburg, of the department, and Professor Gregory Breit, of the University of Wisconsin, have uncovered new and important findings, but most fundamental of all was the detection and measurement of the enormous force within the cores of atoms that binds their parts together and prevents the universe from consisting of nothing but the nuclei of the simplest atom, hydrogen. Thus the program which began and still seeks explanations of earth and solar magnetism has led into the hearts of the tiniest things in the universe. But neither the tremendous force there discovered nor any other fact of modern physics has yet led to a clue which might explain the permanent magnetism of the earth.

To explain these large magnetic fields in the sun and earth, it appears that either some new complexity will have to be introduced into the fundamental concepts of physics or that some new and yet unfound principle of physics will have to be discovered.

Dr. Tuve indicated that the first view seemed to be the more probable. However, some unknown atomic force occurring at the extremely high pressures within the earth and the sun may be the cause of the large magnetic fields. The nuclei between which the new force of attraction has been found to exist are so minute that if one of them were enlarged to a diameter of half an inch the fingers and thumbs of the investigators on the same scale would be approximately 10,000,000 miles long.

RENTSCHLERIZATION

A "MICROBE DEATH RAY" to keep your food from spoiling, your wounds from getting infected and your lips from being soiled with other people's germs traveling on glasses and table ware, was demonstrated to the American Institute in New York on March 3.

This development may also add a new word to American vocabularies—"rentschlerization." It is derived from the name of the man who developed the ray, Dr. Harvey C. Rentschler, director of research in the lamp division of the Westinghouse Electric and Manufacturing Company. "Rentschlerization" will rank with "pasteurization," it is claimed. "Rentschlerization" is the process of killing disease germs by exposing them to a single ultra-violet ray with a wave-length of 2,537 Ångstrom units. The ray is harmless to humans. Associated with Dr. Rentschler in developing the microbe death ray was Dr. Robert F. James, Westinghouse biophysicist.

The ray, released from slender tubes called sterilamps, made its surgical début in the operating room of Duke University Hospital under the direction of Dr. Deryl Hart, surgeon-in-chief. Dr. Hart described this use of the ray at the meeting. Infections after surgical operations do sometimes occur even with the most careful, germ-free surgical technic, because before the development of the new microbe death ray it was impossible to keep the air of an operating room germ-free. Dr. Hart reports that since installation of the ray tubes, post-operative infections have practically disappeared from his operating

room. Furthermore, patients had much lower temperature curves following operations in which these tubes were used to keep germs out of the air over the operating table. As a result of Dr. Hart's successful experiments, which have been in progress for nearly two years, sterilamps have been installed at the Mayo Clinic, the New York Medical Center, the Perth Amboy, N. J., Hospital, and elsewhere.

The search for the ray started from the angle of food preservation. Cooking is one form of sterilizing food, and certain chemicals will preserve foods. So do refrigeration and pasteurization. None of these methods is universally practicable, it was pointed out at the meeting. Neither chemicals nor heat, for example, can be satisfactorily applied to the preservation of such perishable foods as meat and often, even in very cold refrigerators, meat is attacked by molds. Now the butcher can install sterilamps in his refrigerator and even in his display cases and keep his meat protected both from germs and from loss of water and flavor due to the low temperatures previously needed to preserve the meat. Keeping glasses and tableware germ-free in restaurants is not only a question of washing them clean and sterilizing them but of protecting them from germs in the air that can reach clean dishes stacked on shelves. Sterilamps seem to be the ideal solution to this important sanitary problem, since they are inexpensive and can be easily installed.—JANE STAFFORD.

BIOELECTRIC DIFFERENCES AND CANCER DEVELOPMENT

A NEW attack on the cancer problem, which combines the techniques of physics and biology and has already disclosed the existence of bioelectric differences between cancer-susceptible and cancer-immune mice, is described by Drs. H. S. Burr, G. M. Smith and L. C. Strong, of the School of Medicine of Yale University, in a report appearing in the *American Journal of Cancer.*

The electrodynamic field of a mouse shows a characteristic change incident to the development of cancer. Mice that developed cancer before the two-hundred and sixtieth day showed marked rises in potentials, amounting to several thousands of microvolts, in readings across the chest. An astonishing fact pointed out by the investigators is that the voltage rise appeared in some cases from 10 days to 2 weeks before the tumor or cancer could be detected by palpation.

Their findings, they conclude, make it clear that "the onset of adenocarcinoma of the mammary gland does something to the electrical pattern of the organism which can be measured with some degree of certainty. In the absence of exact information, it would seem probable that this effect upon the bio-electric properties is initiated at about the time the new growth appears. The data suggest, moreover, that as the new growth proceeds, the chest potentials go up until they reach a peak not long after the tumor becomes palpable. This increase in voltage across the chest is not unlike the increase in head-tail gradients recorded in the salamander and chick. Unlike the growing embryo, however, the chest potentials return to within normal limits in from two to four weeks. This suggests that the animal has established a new equilibrium with respect to the new growth."

ITEMS

DRILLING forty feet below the surface to locate buried sea deposits of millions of years ago in the vicinity of Washington, has been made simpler through the development by Dr. N. H. Darton, retired member of the U. S. Geological Survey, of a special earth-auger. Financed by the Geological Society of America, Dr. Darton is using this tool, to make an underground survey of the District of Columbia. Although in his seventy-third year, Dr. Darton puts in long hours in the field, studying these previously-inaccessible deposits. Collaborating in this work is Dr. Arthur Keith, another retired Geological Survey member, who retains his interest in field work. The report of the findings will be published by the U. S. Geological Survey.

TUNGSTEN, chromite and magnesite, found on the supposedly barren Kamchatka Peninsula, stretching out eastward from the Asiatic mainland, belie the long-standing geological opinion that there is nothing there, according to reports from Tass, Soviet news agency, describing explorations in Kamchatka by Soviet investigators during the field season of 1937. Three thousand square miles of the northern peninsula were explored by the party during 1937. Work is scheduled to continue during 1938.

ENGINEERS at the Los Angeles Institute of Radiology are assembling the world's largest cascading transformer to step up power obtained from local power supplies to 1,000,000 volts to produce penetrating x-rays. Five separate transformers, each stepping up the current by 200,000 volts, will be linked in series to produce a current that will generate extremely "hard" or short x-rays, useful in treating cancer. Only the penetrating short rays are useful for cancer and the higher the generating voltage, the greater the percentage of the desired radiation. The installation is being made by Westinghouse engineers.

SHELLED Yellow Dent corn is highly preferred by the Hungarian partridges, prairie chickens, rabbits and squirrels fed at the thirty maintained stations in southeastern Wisconsin game areas. The measuring stick for wildlife food preference was the residues of other grains found in the 15 compartment food troughs. Usually the corn compartment was empty before a noticeable amount of other grains had been eaten. Food favorites other than Yellow Dent corn included wheat, buckwheat, corn and buckwheat mixed in equal quantities, yellow popcorn and barley. Actual comparisons showed that at one pheasant station ten parts of corn were eaten to three of buckwheat, while at a quail-partridge station the consumption of corn was three times that of barley and thirty times that of oats. Unexplained was the observation that some foods highly recommended for use in winter feeding, such as Black Amber sorghum, were taken sparingly if at all.