



WAR SOUVENIR

This is the x-ray picture that revealed the knife blade, white streak in upper left corner, in Mr. Sherry's brain.

MEDICINE

Lameness Traced to Knife Blade in Brain

FOR OVER fifteen years James P. Sherry of Rochester, N. Y., carried a knife blade buried in his brain without knowing it.

Recently, severe headaches and lameness in one leg led him to seek medical aid. Dr. Charles S. Gallaher, of the medical department of the Eastman Kodak Company where Mr. Sherry is employed, examined the man, detected an abnormal condition of the eye on the side opposite to the lame leg, suspected a brain abscess and took an X-ray picture, which showed the knife blade in Mr. Sherry's brain. A fine scar was then found on his scalp. Removal of the blade by surgical operation resulted in the patient's complete recovery.

Strangely enough, Mr. Sherry was not only ignorant of the blade's being in his brain, he did not even remember ever suffering a head injury. The only possible explanation is that the blade entered his brain at the time of a war injury. Mr. Sherry was struck on the elbow by shrapnel in the Argonne. For hours afterward he was dazed. Mr. Sherry and his medical attendants believe that the knife blade was in the same shell and was driven through the skull by the same burst, probably going in red hot and cauterizing the wound it made.

Science News Letter, March 3, 1934

CHEMISTRY

First Chemical Proof Obtained For Artificial Transmutation

Reaction Shows That One Element Turns Into Another; Three New Radio-Elements Now Introduced to World

THE FIRST chemical proof of the artificial transmutation of the elements has been obtained by M. and Mme. F. Joliot, working at Mme. Curie's famous Institute of Radium in Paris. Mme. Joliot in her scientific work uses her maiden name, "Irene Curie." She is the daughter of Mme. Curie.

This achievement came as the result of the Joliot's discovery a few weeks ago of artificial radioactivity. Alpha particles or helium atom hearts from naturally radioactive polonium, when flung at aluminum, boron and magnesium, resulted in emissions of positrons even after the bombardment was stopped. In the case of boron the activity continued for nearly 15 minutes. This was hailed as an important step in understanding the structure of the atom.

The positron is the recently discovered positive electron, now considered one of the ultimate particles of matter.

The theory of the mechanism of the artificial radioactivity is that the helium atom combines with a boron atom forming a nitrogen atom which is unstable and disintegrates into a stable carbon atom with the emission of a positron.

The Joliot's used a strong radioactive source and succeeded in getting about 100,000 atoms of the artificially radioactive element, which is nitrogen in the case of the attack on boron. This may seem to be a large number of atoms but it is a very small amount of material upon which to perform a chemical experiment. And they had to work fast in order to complete the reactions before the activity disappeared.

They irradiated a small amount of the chemical compound, boron nitride. They then produced ammonia gas by heating this activated boron nitride with caustic soda. Tests upon the ammonia showed that it was unusual. The artificial radioactivity had forsaken the boron and had traveled away with the ammonia. This was proof that the radioactive element formed is nitrogen. Similar experiments were performed with aluminum by dissolving irradiated alu-

minum in hydrochloric acid and finding that the activity is carried away with hydrogen gas that can be collected.

Here was chemical proof of transmutation, one element turning into another, the modern realization of the old dream of the alchemists. It was good proof also that the helium heart or alpha particle is captured in these reactions.

Three new kinds of chemical elements can now be introduced to the world. The unstable, radioactive forms of nitrogen, silicon and phosphorus made in the transmutation of boron, magnesium and aluminum are the new radio-elements. The Joliot's propose special names for them: radionitrogen, radio-silicium, radiophosphorus.

They suggest that these new elements and others similar to them will be formed when physicists try other experiments in atomic rearrangements with the aid of atomic projectiles. For instance, radionitrogen might be formed if an ordinary carbon atom captured a deuteron, and this event would be followed by the emission of a neutron. The deuteron is the nucleus or heart of heavy-weight hydrogen (deuterium) while the neutron is the electrically neutral particle which is about as heavy as a hydrogen atom. It is probable that this suggestion will be tested at Berkeley or Pasadena, Calif., where experiments with deuterons have been very successful.

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ASTROPHYSICS

Greatest Sun Heat Set At 21 Million Degrees

TEMPERATURE of the sun: Average—12,000,000 degrees. Maximum—21,000,000 degrees. These figures are on the Centigrade scale used by scientist.

This is the latest solar heat report announced by Sir Arthur S. Eddington, the British astronomer-physicist, as the result of calculation made according to the latest theory.

These high temperatures represent a reduction from the 1924 Eddington esti-

mate which was 40,000,000 degrees.

The number of atoms in the sun is 1,000,000,000,000,000,000,000,000 (ten to the 24th power) and the number of free electrons is at least as great.

The number of X-rays which constitute the internal radiant heat of the sun, total 20,600,000,000,000,000,000,000 (20,600 times ten to the 18th power). Sir Arthur believes that this number is correct within one per cent.

These X-rays are continually absorbed by the atoms and are emitted again and again. Thus energy is conserved and the sun has a long expectation of life.

Sir Arthur considers that it is possible that the sun consists of as much as 99.5 per cent. hydrogen but that a content of 35 per cent. is more probable. The recognition that a large proportion of hydrogen exists in the stars is considered by Sir Arthur to be the most important advance in stellar theory in the last seven years.

As to whether the sun or man-made high voltage can do the most damage to atoms, Sir Arthur is backing the high voltage developments now in progress of which the apparatus at Cambridge's Cavendish Laboratory is typical.

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GEOLOGY

Yellowstone Park Has Great New Hot Pool

YELLOWSTONE National Park has a new pool, located in Midway Geyser Basin. Ranger Frank Child passed through the region late in January, and saw nothing unusual. But when he returned during the following week, the pool was there, about forty feet in diameter.

In being born it caused the dislocation of several tons of rock. Some of the dislocated rocks, now thirty feet distant from the pool, are estimated to weigh more than 600 pounds.

The new pool is very hot and very muddy. Violent boiling occasionally takes place on the north side. When this occurs a slight shock can be felt several feet from the edge.

It is located just east of the Black Diamond pool, from which it is separated by a narrow ledge of rock. The Black Diamond is about fourteen inches above the level of the new pool. A small stream of water flows from it to the new pool, and from the latter a stream six times as large in volume is flowing into the river.

Science News Letter, March 3, 1934

PHYSICS

Americans Propose Theory Of Electron and Positron

A THEORY is a mere theory until something that it predicts actually happens. Because Prof. P. A. M. Dirac of Cambridge University, England, evolved a theory of the electron that foretold the existence of the positive electron (positron) which was discovered in cosmic ray crashes by Dr. Carl D. Anderson of Pasadena about 18 months ago, the Dirac formal mathematical symbolism received the intellectual homage of scientists. Incidentally, Prof. Dirac himself shared the Nobel prize for 1933.

Now, two Americans have offered a radically new theory of the electron and positron which goes beyond the Dirac theory and makes more predictions which scientists will proceed to test. Dr. W. H. Furry, a National Research Fellow, and Prof. J. R. Oppenheimer of the University of California present their theory in *Physical Review*, publication of the American Institute of Physics.

One consequence of the Furry-Oppenheimer theory is reminiscent of the famous Heisenberg principle of uncertainty. Roughly, that idea was that it was impossible to know just where a particle was and at the same time know just how fast it was going. The new theory states that the total energy of a system of particles in the presence of an external electro-magnetic field and the total charge and current density of such a system may be determined. But this can be done only at the expense of a precise knowledge of the number of electrons and positrons that are present in the system.

This means that the scientists can not determine with absolute precision the exact spot where cosmic or gamma rays create a pair of electrons. And this is something that scientists have wanted very much to know ever since Dr. Anderson's discovery of positron-electron twins born of cosmic ray smashes into matter.

Due to this necessarily incomplete knowledge, the physicists are forced to conclude that this creation of matter from energy, if such it be, occurs outside the nuclei of atoms. The intense electric fields of the nuclei have little

to do with energy-into-matter conversion, if the theory is correct.

One prediction of the new theory can be submitted to experimental checking. It is that if protons (hydrogen nuclei) are shot through an atmosphere of other protons they will suffer a scattering that differs from that which would be predicted by the old and usually reliable Coulomb law that "force is inversely proportional to the square of the distance between electrically charged particles." If this proves to be the case, the new theory will have gone through its first fire.

Science News Letter, March 3, 1934

BIOLOGY

House Bill Restores Cuts in Research

FOUR IMPORTANT research activities in the Bureau of Biological Survey, which the Budget Bureau had scheduled for annihilation in 1934-35, have been restored in the Agricultural Department Appropriation bill reported to the House.

These are (1) Research on the food habits of birds and animals; (2) Migratory bird investigations; (3) Research on control methods for predatory animals; and (4) Researches on the production of fur-bearing animals.

Restoration of these items in the bill has added a total of \$142,803 for these lines of work.

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HISTORY OF SCIENCE

CWA Worker Finds Copy Of "The New World"

A CWA worker, a library helper, has just brought to light an extremely rare and valuable work on America's discovery. It is a book written within twenty years after Columbus' death, printed in beautiful German type and bound in a wood cover shod with tooled leather.

It belongs to the Smithsonian Institution at Washington. Only two other copies are known to exist, and these also