

PHYSICS

Super-Heavy Elements May Be Stuff of Dense Dwarf Stars

Material 10,000 Times as Massive as Any on Earth Would Yield Cosmic Ray Energies When Atoms Split

THE astounding picture of cosmic rays generated in the dense white dwarf stars of the universe by the splitting of super-heavyweight elements, nearly 10,000 times as massive as any known on earth, is suggested by Dr. Felix Cernuschi, Argentine exchange scholar at Massachusetts Institute of Technology.

To generate cosmic ray particles of 1,000,000,000,000 electron-volts, like those which have been observed, requires elements having atomic number 10,000 and atomic weight 26,000. (The heaviest element found on the earth is uranium of atomic number 92 and atomic weight 238.)

In a report to the Physical Review, published today, Dr. Cernuschi suggests that the kind of splitting recently found to occur in uranium under neutron bombardment—which makes a single uranium atom liberate about 200,000,000 electron-volts of energy—is possibly going on in his hypothetical super-heavy elements too.

His X elements, or whatever name they may be given, would break down into two fission elements having atomic number 5,000 each. And then these would each in turn go into an element of 2,500 atomic number and so on; all the while liberating tremendous quantities of atomic energy that would appear both as light and as invisible atomic particles (the cosmic rays).

The new Cernuschi hypothesis is not only intriguing because it is the first application of the new uranium splitting phenomenon to cosmic ray theory but also because the suggestion of super-heavyweight elements would account for the known dense white dwarf stars.

These stars, like the small dwarf companion of the bright star Sirius, are known to have a density 50,000 times as great as water. A cubic inch of the material from this star would weigh tons.

It has previously been suggested that such stars were "collapsed" stars con-

sisting only of neutron particles. Dr. Cernuschi's suggestion gives an alternative explanation which possesses the additional virtue of providing a reasonable explanation of the origin of cosmic rays.

Prof. M. S. Vallarta of M.I.T., well known for his studies and calculations in astrophysics and cosmic rays, was the faculty adviser of Dr. Cernuschi for the new hypothesis.

Drs. W. Baade and Fritz Zwicky of California Institute of Technology have suggested that super-novae stars (having a brightness of more than 630,000,000 times that of our sun) were exploding stars and the place of origin of super-high energy particles like those found in cosmic rays.

Dr. Vernuschi says he is unable to agree with parts of their reasoning as to this origin of cosmic rays and adds that no known atomic transmutations appear sufficient to account for the tre-

mendous energies cosmic rays possess. Hence he calls on his new hypothesis of the fission of super-heavyweight elements.

Science News Letter, July 15, 1939

PUBLIC HEALTH

Undulant Fever Can Be Spread by Water

UNDULANT fever can be spread by water, it is now known. This disease, serious, long-drawn out and marked by frequent relapses, has hitherto been thought to spread only through the milk or meat of infected domestic animals, particularly cows, goats and pigs. Other names for the ailment are brucellosis, from the family name of the germs, brucella, and Malta fever, from the island of Malta where it was first differentiated from other fevers.

The first outbreak of water-borne undulant fever in this country, with 80 cases and one death, is described by Dr. Don W. Gudakunst, formerly Michigan State Commissioner of Health, and members of his staff, in the current issue of the *American Journal of Public Health*.

The outbreak occurred under rather special conditions, so that scientists feel that infected meat and milk are still the chief means by which this disease is



MOST BEAUTIFUL

Given an award by the American Institute of Steel Construction as the most beautiful monumental bridge constructed during 1938, is this \$3,000,000 structure at Middletown, Conn. It was designed by William G. Grove under the direction of L. G. Sumner, engineer of bridges and structures, Connecticut State Highway Department.

likely to spread among the general population. The water-borne epidemic, however, not only shows the possibility of the disease spreading through water but emphasizes again the health dangers of faulty plumbing.

Faulty plumbing was part of the combination of circumstances that led to the outbreak, which occurred on the campus of Michigan State College. The epidemic was limited to persons who had been in the bacteriology building, where the undulant fever germ was being studied. Only a few of the patients, however, had handled the germs. These got into the building's water supply from the dishes and test tubes used in growing and studying them.

Ordinarily dishes in which germs are grown are sterilized before being washed. This procedure was followed but the sterilization was inadequate. On top of this, the plumbing was such that the water in which the contaminated dishes were washed could be siphoned back into the water supplied to other parts of the building.

Science News Letter, July 15, 1939

GENERAL SCIENCE

German Science Decline Reported in AASW Survey

WHAT IS happening to German science under impact of National Socialism is reported in a documented report prepared by the American Association of Scientific Workers' Boston-Cambridge Branch. Upon such findings this young but active organization has recommended a boycott of German scientific materials as a means of combating Nazi ideology.

German universities have lost over half their students in the last five years. The 116,154 students of 1932-33 have decreased to 53,753 in 1937-38, which is 53.7% loss, with greater percentage losses in engineering and the natural sciences.

University teaching staffs dropped 15.8% net in size in four years under Hitler, and it seems likely that about 1500 scientific workers in universities were deprived of their positions for political reasons. The University of Vienna in one year of German occupation lost 48.1% of its teaching staff as contrasted with 6% the preceding year.

"The German universities and research institutes have been so reorganized that they appear to be no longer so well adapted for the training of new investigators and for the promotion of current research," the report declares.

Wide-spread opinion among American

scientists, checked by surveys of actual work produced, provide inductive evidence of a decline in German scientific output. Research as measured by pages published in German chemical, biochemical and physiological journals has fallen off 50% or more, while English and American journals either show no change or an increase. There has been a relative increase in foreign contributors to certain journals, so German contributions are less than page counts indicate.

With a few exceptions made for men of outstanding reputation, teaching and

development of theoretical physics have been for all practical purposes forbidden, the report declares. Physics and mathematics journals have lost quality, and in the case of the international abstracting journal *Zentralblatt für Mathematik*, political interference has caused resignations of its American and many other foreign editors. The two leading German sociological journals are now published in Paris and New York, and the famous philosophical journal *Logos* has become a propaganda instrument.

Science News Letter, July 15, 1939

GEOLOGY

Hollow Bullets Fired Down Take Oil Well Samples

See Front Cover

HOLLOW "bullets" fired deep underground from special 18-shot well guns are the newest feat of petroleum geologists to get exact information on the location of salt domes, oil-bearing sands and other formations which mark valuable oil resources.

The hollow bullets are fired into the side walls of drill holes and take samples which give final answers to information obtained by electrical prospecting.

The oil well "gun" stands higher than a man and has a diameter sufficient to permit it to enter a 5-inch bore hole. It is pictured on the front cover of this week's *SCIENCE NEWS LETTER*. Along its length are three sets of six "bullets" each. Any one of the 18 can be fired electrically from the surface of the ground.

When electrical prospecting indicates interesting variations in electrical resistance which may mark a transition from water-sand to oil bearing sand at say 6,900 feet, it is only necessary to lower the sample gun to that depth and quickly obtain a specimen of the geological formations at that point.

Core sampling, state E. G. Leonarson and D. C. McCann in a report to the American Institute of Mining and Metallurgical Engineers, can obtain similar information but taking continuous core samples is a costly procedure not always economical in well drilling.

The new method, state the experts of the Schlumberger Well Surveying Corp., permits rapid cheap drilling with the ability at any later date to go back and obtain samples at any given point beneath the surface.

The bullets in the sampling gun are fired by powder and project an empty metal cylinder into the side of the well to a depth of several inches. Because the cylinder is open at both ends it passes through the meaningless mud which may line the sides of the drill holes and enters the true geologic structures. Strong wires attached to the "bullets" pull them out. To prevent loss of the whole gun by breakage of its cable the wires for each bullet have a lower strength than has the cable. If a bullet becomes stuck its wires break off before the cable does.

About 70 per cent. return on samples is obtained, the experts report.

Science News Letter, July 15, 1939

ENTOMOLOGY

Fly Makes Mosquito Carry Its Eggs to Human Victims

MOSQUITOES have long stood convicted of the crimes of transmitting malaria, yellow fever and other diseases by their bites. That is a relatively simple and easily understood process. A much more complicated job, in which the real villain is a tropical botfly and the mosquito is a bullied and helpless accomplice, is described in the magazine *Natural History* by Dr. C. H. Curran, associate curator of insects at the American Museum of Natural History.

Botflies are insects that lay their eggs on the skin of animals. The emerging larvae burrow into the tissues, where they live as parasites, causing more or less discomfort and pain, until they are ready to emerge as adults.

This particular botfly, however, never visits its victims, which include monkeys and other mammals as well as human