

PHYSICS

# Is Search for Neutrino Vain? Particle Proves Elusive

Possibility That "X" Particle May Not Even Exist Causes Friendly Controversy Among Physicists

DISCOVERY last year of the new "X" particle in atomic physics, which has a mass intermediate between that of the electron and the proton or core of the hydrogen atom, has started scientific investigation out of which has grown an interesting and friendly scientific controversy. Scientists are wondering if the elusive neutrino particle, postulated by theory but as yet unfound, will ever be discovered.

## Handy in Explanation

The neutrino—a non-charged particle without mass—has been suggested to explain theoretical aspects of atomic physics where small discrepancies in energy were needed. It was convenient to have neutrinos around in this case so that the energy in transmutation experiments would balance before and after the experiments. Otherwise the physicists would have had to admit that the conservation of energy no longer held true; a long-held and time-tried concept which they hated greatly to discard.

When the "X" particle was discovered, with a mass 130 times that of the electron and then later with a mass 350 times that of the electron, a preliminary suggestion was that it might consist of an electron bound with a sufficient number of neutrinos to make up the observed mass. This suggestion did not

"take" well with most physicists, so alternative explanations of the mass of the "X" particle were brought forth.

Prof. G. E. M. Jauncey of Washington University, St. Louis, for example, suggested that the apparently variable mass of the "X" particle came about because it was created from the energy of a photon of cosmic radiation. Part of this enormous energy, he said, was used to give the impacted electron velocity and energy of motion and some of it was turned into increased mass of the electron. This explanation needed no neutrinos to give the observed particle its mass.

With this idea as a starting point, Prof. Jauncey has gone on to suggest that perhaps heavy particles other than the "X" particle or so-called heavy electron might be created by a similar process.

## Beta Ray Spectrum

In particular, Prof. Jauncey set out to find a new explanation for the long-puzzling matter of the continuous beta ray spectrum observed when radioactive elements disintegrate. Beta rays, of course, are another name for electrons. A continuous beta ray spectrum means that the electrons liberated from radioactive elements travel varying distances through the air as they are liberated. They do this apparently for all distances

up to some upper limit beyond which they will not go.

Because atomic physics has had such good success with quantum theory, which postulates that energies are not liberated or absorbed continuously but in discrete stages called quanta, it has been most difficult, theoretically, to figure out how the liberated beta rays showed such a continuous spectrum.

Prof. Jauncey now explains this well-known observation by suggesting that all the beta rays emitted from a particular radioactive disintegration have the same energy and that their different distances of travel through the air come about because they have different masses, and different velocities of liberation. The basic factor is that the product of mass of the beta ray times the velocity must be a constant so that heavy mass goes with low velocity (and short range) and vice versa.

## Failed to Confirm

With this suggestion of Prof. Jauncey's comes the good-natured and friendly scientific controversy that is now going on in the staid pages of the highly technical *Physical Review*.

From the University of North Carolina comes the report of Prof. Arthur Ruark and his research assistant, Creighton C. Jones, that studies of experiments performed by Dr. F. C. Champion of Cambridge University, England, fail to disclose the experimental findings that should be made if Prof. Jauncey is correct in his theories about "heavy" particles.

In an interview with a Science Service correspondent at the University, Prof. Ruark said the work "definitely disposes of" Prof. Jauncey's suggestions. Further experiments are being performed, however, "to make the matter doubly sure."

"It is known that when beta particles, or electrons, come out from the atoms of radioactive materials, many of them have very high energy, and many others have much less energy," said Dr. Ruark in discussing the experiments. "There are excellent grounds for believing that in every case the atom gives up the same amount of energy, so if the electron does not carry it away, it must escape from the atom in some form which has not yet been detected."

In a letter to the editor of the *Physical Review*, side by side with one from Prof. Jauncey, Prof. Ruark and Mr. Jones state that for a specific kind of radio-active disintegration—that from Radium E—Prof. Jauncey's theory predicts a greater value than is actually observed

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for the energy of beta ray emission. "These results," they say in their journal report, "constitute a definite disproof of the hypothesis of heavy beta-particles."

Their analysis of the work of Champion say Prof. Ruark and Mr. Jones, "have no bearing on the possibility that the heavy particles reported in cosmic-

ray experiments are electrons of exceptional rest mass."

What they are questioning is the correctness of applying a hypothesis for cosmic ray energies of a billion and more electron-volts to the lesser degree of energy that exists in radioactive disintegrations.

*Science News Letter, February 19, 1938*

MEDICINE

## Know Arthritis Type Before Pulling Teeth, Dentist Warns

**T**HE VEXING and much disputed question of whether or not to pull teeth in treating arthritis or rheumatism, to call it by its old-fashioned name, depends to some extent on the type of arthritis in any given case. This is the opinion of Dr. George F. O'Brien of Loyola University School of Medicine.

If the patient has osteo-arthritis, infection is not a factor and the dentist's job, Dr. O'Brien thinks, is one of preservation. The patient's "chewing capacity" must be preserved or improved. Wholesale removal of teeth will not benefit him, since his nutrition will suffer and anything that interferes with his general condition will aggravate the arthritis. It seems to Dr. O'Brien far more logical to do constructive dental work, if at all possible, than to risk the immediate shock or the malnutrition and other effects that may result later from the patient's inability to manage plates and false teeth if his own are removed.

For the type of arthritis known to physicians as non-specific infectious arthritis, the question of pulling teeth depends on whether the physician and

dentist believe teeth can be a focus of the infection that is causing the arthritis.

The chief battleground is the pulpless tooth that shows no signs of trouble in X-ray pictures. These teeth may give trouble even if the X-ray does not show anything suspicious, and even if not infected at the time of examination, they may become so later. If physician and dentist agree that such teeth are possible sources of danger, there seems no reason, Dr. O'Brien believes, for pulling only one such tooth and leaving the rest in.

There is also little point, in Dr. O'Brien's opinion, in removing teeth if other foci of infection, such as in tonsils and certain glands, are not removed.

*Science News Letter, February 19, 1938*

There are about four earthquakes a day in Japan.

It takes a human being's eyes about 25 years to complete their development.

Ancient Rome, like modern Italy, had its youth organization of boys who paraded in military style.

EUGENICS

## Sterilization Would Not Wipe Out Mental Disease

**S**TERILIZATION of the mentally abnormal would not abolish mental disease, Dr. James Page of the University of Rochester and Dr. Carney Landis of the New York Psychiatric Institute have concluded after a study of conditions in Europe and the United States. It would not even greatly reduce the future incidence, they believe.

The difficulty with a sterilization program, these scientists say, is that less than half the patients admitted to mental hospitals are suffering from mental diseases that are hereditary. Most of those who do inherit their illnesses are the children of parents who were latent carriers of the disease but themselves outwardly normal and therefore not touched by sterilization programs.

Denial that the present complexity of life has resulted in any alarming increase in mental disease is made by these investigators. The increase in both America and Europe has been slight, they said. In New York, the moderate increase that has occurred is primarily among old people.

*Science News Letter, February 19, 1938*

A case of leprosy that developed 43 years after exposure to the disease has been discovered in Scotland.

### A LONG BLAST

*No lives were lost, not even of civilians, when this blast was loosed, for the prosaic purpose of digging a ditch under water in the Susquehanna river for the laying of a pipe line. The picture was made by Du Pont Company photographers while the explosion was literally at its height.*

