

PHYSICS

Eddington Reveals Details of His Theory of the Electron

If New Paper Stands Test of Scientists It Will Remove Chief Obstacle to Progress of Physics, American Thinks

By Dr. R. M. LANGER, California Institute of Technology

SIR ARTHUR EDDINGTON, the British scientist, has finally laid his mathematical cards on the table and offered in the *Proceedings of the Royal Society of London* what he claims is a rigorous proof of his contentions about the electron. He has, during the past three years, published seven other papers on this subject, none being complete. Each time he left some unsatisfactory gaps in his proofs but asserted, nevertheless, that he was sure all would be well and that the next paper would be conclusive.

The scientific world was decidedly incredulous. The theory did not appear plausible. It was difficult enough so that physicists who were capable of handling the material considered it would not pay to take the subject too seriously until Eddington himself had worked it through. They agreed it was a clever idea, but felt that a scientist ought to have more than a hunch before offering to publish a result.

Now Eddington is a brilliant man. He has made mistakes, it is true, but when he publishes an eighth paper, one can scarcely disregard it. Such persistence must be well supported. Moreover, this paper is attractively arranged. It begins by pointing out some of the errors of the previous papers. The premises are acceptable. The results claimed are of most extraordinary significance. Finally it does carry weight when a man like Eddington definitely says his calculations are rigorous.

Physicists, with the help of mathematicians, will now undertake to check the argument and in a few months we shall know whether there are any serious flaws in it. The difficulty in reading the article lies in the fact that two separate fields are involved, viz., quantum mechanics and relativity. There are not many sufficiently experienced in both of these to be able to read the proofs without hard work. The pre-

sentation is extremely concise and the reader will have to fill in many large gaps—certainly no statements can be accepted without verification. Prestige counts for little in these matters.

No matter how critical the previous attitude was, the proofs, if correct, will be readily accepted. Eddington will then have obtained undoubtedly the greatest results of both the quantum theory and of the relativity theory. The theory of the electric charge will have been improved to a degree of perfection unmatched in natural science. The chief obstacle in the path of progress of the last three years will have been removed and physics (Turn to page 315)

MEDICINE

May Get Tularemia From Mosquito Bite

MOSQUITOES, which play an important role in the transmission of malaria and yellow fever, may also carry tularemia or rabbit fever, Cornelius B. Philip, Gordon E. Davis and R. R. Parker of the U. S. Public Health Service have found in studies made at the Rocky Mountain spotted fever laboratory at Hamilton, Mont.

The part played by the mosquito in carrying tularemia is purely mechanical.

If a mosquito is interrupted while feeding on an infected animal, and bites soon after, he can pass the infection along to his next victim. The disease may also be acquired when infected mosquitoes are crushed on the skin, with or without subsequent rubbing, and when mosquito excrement is deposited on the skin.

The investigations here were undertaken after a few cases had been reported in each of which a mosquito bite was thought to have given the infection. While this is possible, the scientists believe it would be a very rare occurrence.

"It is probable that at most only infrequent infection of man would occur in this manner," they concluded.

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ARCHAEOLOGY

Eskimo Burial Mystery Cleared Up at Point Barrow

THE MYSTERY of whether Eskimos of Point Barrow had an old custom of burying their dead in houses of the villages, or whether they built house-like sepulchres for them, has been cleared up by the excavation of ancient graves.

The solution of the mystery is that Eskimo dead were not buried in house-like tombs at all, is the report brought back by James A. Ford, who has spent more than a year continuously in the Alaskan Arctic, on an expedition for the U. S. National Museum.

Digging into small natural knolls in prehistoric Eskimo graveyards at Nuna-vaak and at Utkiavik, on Point Barrow, Mr. Ford found burials of some very old, prehistoric Eskimos. Their earthen tombs were made by slashing off the top



SKULL OF A BOW-HEAD WHALE

BIOGRAPHY

Einstein Read Philosophy When Only 13 Years Old

EINSTEIN as a high school student "ate up" physics and mathematics, and at thirteen was reading the abstruse philosophical works of Kant. These and other high-lights from the childhood of the great German scientist are given in an article in the first number of *Scripta Mathematica*, a new journal of the history of mathematics, by Dr. Max Talmey, a New York physician.

Dr. Talmey first became acquainted with the young Albert Einstein when he was a medical student at the University of Munich, and Einstein a school-boy. Although there was a difference of eleven years in their ages, young Einstein was so mature-minded that this was quickly lost sight of, and the two became fast friends. Talmey gave Einstein the first scientific works he ever read, two popular books in physics, and followed these with a text in plane geometry. Einstein disposed of all these in short order, and soon went beyond his older friend's depth in mathematics. Then he began to show interest in philosophy, and Talmey introduced him to the works of Kant, which he tackled with relish and apparent understanding at the mature age of thirteen.

"I associated frequently with the young scientist for five years," Dr. Tal-

mey states, "and never saw him reading any light literature or keeping company with boys of his age. He usually held himself aloof, absorbed in books on mathematics, physics and philosophy. His recreation he found in music. He had taken instruction in violin playing, but only for two years."

Dr. Talmey lost touch with the Einstein family when they moved to Milan, taking young Albert with them. Subsequently they went to Zürich, where Einstein himself became a Swiss citizen in 1900. During his early post-graduate years he had rather a hard time of it, at first teaching, then in a poorly paid post in the Swiss Patent Office. During these years Dr. Talmey saw him only once, and then again lost touch with him through his own emigration to America. The old friendship has been renewed on the occasion of Prof. Einstein's visits to this country.

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will rush ahead for several years more until the immediate possibilities of this theory have been exhausted.

The list, which follows, of some of the apparent results of Eddington's theory may not appear imposing to the layman, but the thoughtful physicist must regard it with deepest satisfaction and must feel that his highest admiration for the achievement is insufficient.

1. Eddington has properly formulated the consequences of the fact that the fundamental electric charges—the electrons—are all exactly alike and interchangeable. This is the principle underlying the whole program. From it alone all the results follow.

2. The inverse square law, with improvements, for the force between electrons is at last derived and not assumed. Thus a blemish, apparent to every beginning student of quantum physics, is removed.

3. The Exclusion Principle of Pauli is deduced from general principles and not mysteriously added to patch up flaws in an imperfect theory. This Principle, used

until now entirely *ad hoc*, is one of the most significant statements ever formulated by man. Roughly it can be stated as follows: Two similar parts of a system necessarily show differences in behavior.

4. The numerical value of the electronic charge is calculated from the velocity of light and the quantum of action. Thus the number of fundamental constants is reduced—a most important achievement in which every physicist can take pride. He needs in his powerful science only four separate constants in terms of which to describe all known phenomena. This result, however, is not yet fully attained—there is a serious discrepancy outstanding, which, if the theory is sound, will bring about new triumphs.

5. The problem of two bodies has for the first time been solved in a satisfactory manner in accordance with the requirements of relativity and quantum theory. The leading workers in the field have spent much of the past four years on this problem without success.

There are other results but these may suffice to indicate why some workers are enthusiastic over the paper. If it proves correct physics will rejoice and will spread the news in all detail. If it proves false, the matter will be dropped, but the "Physical World" will hereafter be very impatient with Sir Arthur.

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PHOTOGRAPHY-ENGINEERING

First Welded Penstock Built In California

See Front Cover

WELDING, an abundant source of beautiful photographs, furnishes another picture for the front cover of the SCIENCE NEWS LETTER this week; but beauty was not sufficient reason for its prominence in the cover position.

The picture was taken within a welded pipe, one-fourth mile long, tilted up a mountainside at an angle of 45 degrees. It is the penstock, or intake pipe, to Los Angeles' San Francisquito power plant number 2.

This pipe, says the Lincoln Electric Company who supplied the photograph, is the world's first arch welded penstock. It varies gradually in diameter from seven feet near the top to six feet at the bottom.

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▼ The Science Service radio address next week will be on the subject,

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HEART DISEASE

by

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Dr. C. S. Williamson

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Professor and Head of the Department of Internal Medicine at the University of Illinois.

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FRIDAY, NOV. 18

at 12:45 P. M., Eastern Standard Time

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Over Stations of The Columbia Broadcasting System

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