

PHYSICS

Variations in Light Speed Not Accepted by Scientists

Dr. Adams Holds Variation Conceivable Only as Last Resort And Not Established by Results of Recent Experiments

Variations in the speed of light are not accepted by Carnegie Institution scientists, on the basis of recently announced results. The discrepancies in the instrumental readings must find their explanations elsewhere. Dr. Walter S. Adams, director of the Mount Wilson Observatory, where the late Prof. A. A. Michelson prepared the latest light-velocity experiments, indicated this in an exclusive statement to Science Service.

"The last hypothesis to be adopted is that the velocity of light varies," said Dr. Adams. "If a man knows accurately when the sun should set but observes that according to his watch it sets five minutes ahead of time, a logical person does not assume that the motion of the sun varies but that his watch is wrong."

By **DR. WALTER S. ADAMS**, Director, Mount Wilson Observatory

THE LATEST average value of the velocity of light, which will doubtless be accepted as the world standard, is announced by the scientists of the Mount Wilson Observatory of the Carnegie Institution of Washington as 299,774 kilometers (186,276 miles) per second. Further analysis of the observations may change the last figure by one or two units. This value compares with the Michelson 1926 result of 299,796 kilometers per second obtained as the result of observing the passage of light between two mountain peaks in California. The new value is 22 kilometers per second (or seven thousandths of one per cent.) lower than the old value.

Certain unexplained variations which exceed considerably the experimental error of measurement have been found in the course of the observations. One of these had for a time a period of $14\frac{3}{4}$ days and another a long period of about one year, but neither period persisted throughout the entire series. The range of variation in each case was about 20 kilometers (12 miles) per second.

The cause of such apparent variations is first of all to be sought in instrumental sources, in possible changes in the

apparatus, the length of the light-path, ground disturbances, errors in the timing mechanism or a possible effect of refractive index in the path of light. The precision required in this difficult experiment is extraordinarily high. It is only as a last resort that we should have recourse to the hypothesis that the velocity of light actually varies. We have long believed this to be a fundamental constant of nature and although a variation is conceivable it is not established by these results.

The present investigation was carried on by Dr. Francis G. Pease of the Mount Wilson Observatory and Fred Pearson of the University of Chicago, working with the mile-long vacuum pipe line at the Irvine Ranch, Santa Ana, California. The apparatus was designed and first used by the late Prof. A. A. Michelson. Although yielding a value for the velocity of light of extraordinarily high accuracy it can hardly settle questions involving quantities of such a minute order as those here considered. For such an investigation it would be desirable to have quartz mirrors, a much more stable pipe-line and

SOCIOLOGY

More War in World As Civilization Advances

WAR HAS been growing more and more common, not less, as the world has grown older and civilization has (presumably) advanced.

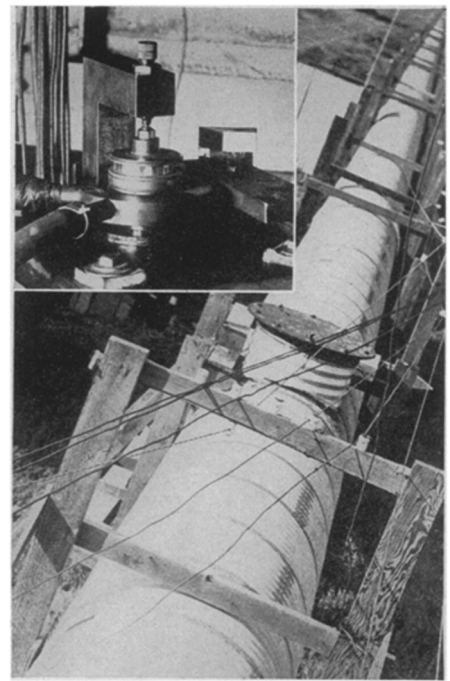
This discouraging but fact-facing conclusion was laid before the meeting of the American Association for the Advancement of Science, by Prof. Pitirim A. Sorokin and Lieut.-Gen. N. N. Golovin of the Harvard University department of sociology.

The two men tried to get a quantitative expression of the warlikeness of the world in each century from the twelfth

elaborate timing devices.

Recent determinations of the velocity of light have shown a tendency toward slightly smaller values. It does not seem necessary, however, to ascribe this to other than coincidence, especially since many of the individual values in the different series of observations frequently overlap another widely.

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MEASURED LIGHT

The mile-long vacuum tube used in the Michelson velocity of light experiment at Santa Ana, Calif., is shown above. The inset pictures the 32-sided rotating mirror which flashed light into the tube.

onward, for Central Europe, England, France and Russia; and from the sixteenth century onward they added the Netherlands, Spain, Italy and Germany. Admitting from the outset that their results could be only rough preliminary approximations, they assigned numerical values to such factors as size of armies, proportion of losses, numbers of nations involved and duration of the conflicts. Statistically manipulated, these figures yielded "index numbers" for the many wars the world has seen through the centuries. (*Turn Page*)