# SCIENCE

VOL. 81 FRIDAY, MAY 31, 1935 No. 2109



SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. MCKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal

Lancaster, Pa. Garrison, N. Y.

Annual Subscription, $6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

# PHOTONS IN CHEMISTRY AND BIOLOGY[1]

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I APPRECIATE the honor of being invited here and the privilege of living in beautiful Ithaca this semester. Wisconsin and Cornell Universities have always been close to each other. From the time of Babcock on, Cornell has sent many young men west to carry the inspiration of research to Wisconsin. Each university has vigorously directed the genius and energy of her students into useful paths.

My subject to-night is "Photons in Chemistry and Biology." The unit of light is the photon, the unit of chemistry is the molecule, and the unit of biology is the living cell. I propose to describe their general properties and their mutual interactions.

What do we know about light? We know that light affects the eye and makes vision possible. We know that light travels with an enormously rapid velocity—180,000 miles per second. We know that white light is made up of various kinds of light having different wave-lengths and that it is absorbed to a different extent by various objects through which it passes. When an object appears red we know that the blue and the yellow and the green and the other wave-lengths have been absorbed, leaving only the red to reach the eye.

When we ask the fundamental question as to what light is, we find ourselves in difficulties. The optical properties of light are very nicely represented by the hypothesis of a wave motion in a hypothetical ether. But this hypothesis is of little help in chemistry or atomic physics. In these fields we prefer to imagine a beam of light as a shower of photons—little bundles of radiant energy distributed in a random fashion in a beam, like bullets from a machine-gun.

On the other hand, this concept is of little use in

[1] A public address delivered at Ithaca, New York, on February 21, 1935.