restrial causes will always remain, and the eclipse plates, whatever their results, can not be cited as proof of the Einstein theory.

CHAS. LANE POOR

DECEMBER, 1922

CHANGE OF FREQUENCY ON SCATTERING

A. H. COMPTON in a lately received bulletin of the National Research Council has reported some recent results obtained by him showing an increase in wave length of X-rays on scattering by graphite of the Molybdenum Kα line amounting to .022Å. U. A. Sommerfeld in his recent lectures, and Compton in *Phys. Rev.*, February, 1923, page 207, have shown that from the quantum theory the shift should be independent of the wave length of the primary beam and of magnitude $\Delta\lambda = \frac{2h}{mc} \sin^2 \frac{\theta}{2}$ where θ is the angle between the incident and scattered beam, h is Planck's constant, m the mass of an electron and c the velocity of light. At $\theta = 90°$ the value of $\Delta\lambda$ is .0242 Å.U $= \frac{h}{mc}$.

Compton states that according to his "absorption measurements, over the range of primary rays from .7 to .025 Å.U. the wave length of the secondary X-rays at 90° with the incident beam is roughly .03 Å.U. greater than that of the primary beam which excites it."

Such a shift, if it exists in visible light, should be detectable by interference methods. The writer has looked for such a shift with negative results. A Lummer-Gehrcke plate of resolving power 360,000 was used and the scattered beam compared with the direct beam using the green mercury line as well as various helium lines. The scattering substance was a block of paraffin and scattering was observed at nearly 180°, so that the shift should have been about .048 Å.U., while the plate should resolve to .015 Å.

Multiple reflections to the number of 16 at nearly 180° between silvered glass surfaces were also tried. All results were negative.

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WHAT IS A PLANT?

THE discussions which have appeared in SCIENCE during the past weeks indicate that botanists are unable to agree as to a definition for a plant. In such a situation a chemist may perhaps be pardoned for offering a suggestion. The presence or absence of chlorophyll is obviously no criterion, for certain plants, *e.g.*, the "Indian pipe," *Monotropa uniflora,* are devoid of pigments. There is, however, one essential *chemical* difference between plants and animals. In *animals* the principal structural material is *protein* or some form of protein, whereas in plants *carbohydrates* predominate. Could not one, therefore, define a plant as "*a living organism whose cell walls consist predominately of carbohydrate materials?*" This would include the bacteria whose cell walls are composed of chitin, a nitrogenous carbohydrate. The fact that chitin forms the shell structure of certain invertebrates, such as the lobster, does not invalidate the definition, for the cell walls of such animals are composed predominately of protein.

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SCIENTIFIC BOOKS

The Anatomy and Physiology of Capillaries, The Silliman Lectures for 1922 at Yale University, by AUGUST KROGH, Ph.D., LL.D., Professor of Zoo-Physiology, Copenhagen University. Yale University Press, 1922.

IN the circulation of the blood "the organs of propulsion, distribution and carrying back are all subservient to the function of exchange carried out in the capillaries and though, of course, each of the great organs is absolutely necessary for the functioning of the whole, it will be difficult to challenge the proposition that the capillaries constitute the most essential part of the whole circulatory system." Thus Professor Krogh early in the first lecture of this series emphasizes the broad importance of his topic. It is a conception which looks upon the particular topic, not as an isolated phenomenon, not merely as a "fragment of an animal," but in its bearing and function in the economy of the whole organism. This standpoint is noteworthy for its similarity to that adopted in two other masterpieces of physiological literature contributed by two previous Silliman lecturers. Krogh, like Sherrington in the "Integrative action of the nervous system" and Hal-