X-Rays. An Introduction to the Study of Röntgen Rays. By G. W. C. KAYE. Longmans, Green & Co.

Since 1895, when Röntgen made his epoch-making discovery of the X-rays, an immense amount of research work, experimental and theoretical, has been done on their properties. This work has produced a remarkable series of discoveries of high interest and fundamental importance. A connected account of the latest results in this branch of physics by one who has made several important contributions to it can not fail to be welcome. Dr. Kaye has succeeded in producing a very useful summary of the latest results together with a brief account of the historical development of the subject and numerous practical details which should be useful to any one working with X-rays. The book contains a number of excellent illustrations.

A few minor errors have crept in; for example, on page 148 it is stated that the total ionization produced by a beam of homogeneous corpuscular rays is independent of the velocity of the corpuscles, which is obviously absurd.

Chapter XII. contains a clear account of the recent work, initiated by Lane, on the diffraction and reflection of X-rays by crystals, which has established the theory that X-rays are merely light rays of very short wave length.

Chapter XIII. contains a discussion of the various theories of X-rays which have been put forward. The problem which remains to be solved is the emission of high velocity electrons by matter when exposed to X-rays.

H. A. WILSON

Irritability, a Physiological Analysis of the General Effect of Stimuli in Living Substance. By MAX VERWORN, M.D., Ph.D. New Haven, Yale University Press, 1913.

To the physiologist who wishes, for the clearing of his vision, to return from time to time to a consideration of the fundamentals of his science, no better opportunity can be offered than that contained in the published volume of lectures on irritability by Professor Max Verworn. The biologist, too, will find in its pages an unusually rich presentation of the facts of cell behavior, interwoven, correlated and interpreted, with meanings that separately they fail to convey.

The book, a re-writing of the Silliman Lectures of 1911, is a philosophical treatment of the nature of irritability as one of the general manifestations of living material, followed by a study of the laws and effects of stimulation, undertaken for the light that such knowledge may throw on the nature of the vital processes of which irritability is a manifestation. Its facts are drawn from the results obtained during twenty years consistently devoted to the problem by Verworn and his pupils, and from the work of others in the same field. The importance of its conclusions may be estimated from the breadth of its experimental foundations.

The opening chapter gives a careful review of the historical development of our modern ideas of the subject, from the first generalizations of Glisson, with whom originated the "doctrine of irritability," down to Virchow's conclusion that nutritive, functional and formative reactions of cells are the basis alike of normal and pathological manifestations in cell activity. The importance of Virchow's teachings in the modern interpretation of diseased conditions has perhaps overshadowed their equally great importance to general physiology: indeed, these, with inhibition (Weber) and narcosis (Claude Bernard), may be looked upon as the starting-point of Verworn's philosophy.

The second lecture, on the nature of stimulation, is perhaps the most striking, containing as it does clearer definitions of the meaning of the words stimulation and irritability than we have had heretofore, and leading to a better understanding of the scope of the unsolved problem of the nature of the vital processes. Beginning with a lucid presentation of the difficulty in differentiating between the "cause," so-called, and the "conditions" of a biological, or indeed of any, process, it is pointed out that "all conditions for a state or process are of equal value for its existence, for