SCIENCE

FRIDAY, SEPTEMBER 21, 1900.

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson N. Y.

ADDRESS OF THE PRESIDENT OF THE MATHEMATICAL AND PHYSICAL SECTION OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

IT is fitting that before entering upon the business of the Section we should pause to take note of the losses which our department of science has recently sustained. The fame of Bertrand, apart from his official position as Secretary of the French Academy of Sciences, was long ago universally established by his classical treatise on the 'Infinitesimal Calculus': it has been of late years sustained by the luminous exposition and searching criticism of his books on the 'Theory of Probability' and 'Thermodynamics' and 'Electricity.' The debt which we owe to that other veteran, G. Wiedemann, both on account of his own researches, which take us back to the modern revival of experimental physics, and for his great and indispensable thesaurus of the science of electricity, cannot easily be overstated. By the death of Sophus Lie, following soon after his return to a chair in his native country Norway, we have lost one of the great constructive mathematicians of the century, who has in various directions fundamentally expanded the methods and conceptions of analysis by reverting to the fountain of direct geometrical intuition. In Italy the death of Beltrami has removed

resulting from the interference of the direct wave train with the train reflected from the back surface of the film. In other words, the colors of the photochromes were similar to the colors of the soap-bubble. This is precisely the principle since made use of by Lippman in his beautiful process.

Zenker's book opens with a short elementary account of the nature of light, of no especial interest. Following this comes a very complete account of the work of Seebeck, Becquerel, Poitevin and others. His account of the claims of Hill, the American photographer, are interesting, final judgment of the case being left to the reader.

Full details are given in most cases of the method of preparing the plates, and the reader will find himself strongly tempted to repeat some of these early experiments.

The third portion of the book treats of the theory of photochromy. The colors of the photochromes had been explained in various ways. Some held that colored oxidation and reduction products were formed while others assumed that the chemical action of the light occurring at the surface, formed a film of varying thickness which showed color precisely like the film of a soap bubble. Zenker effectually demolishes this theory by showing that prolonged exposure, by increasing the thickness of the film, should change the color, which is not the case.

He then advances his own beautiful theory, not abandoning the soap film idea, but presenting it in a wholly new light. He conceives the light waves as penetrating the film and suffering reflection at the back surface. The reflected waves interfere with the oncoming waves forming a stationary system, the ether within the film vibrating in nodes, like the string of a musical instrument when sounding a harmonic. He shows us that there will be planes of vibration within the film parallel to the reflecting surface situated half a wave-length apart. In other words the distance between the planes of maximum vibration will depend on the wave-length or color of the light. If the silver is reduced in these planes and not at the nodes (when there is no vibration) we shall have reflecting laminæ formed, which will act like the upper and lower surface of a soap film and show interference colors. The light most copiously reflected under these conditions will be of a color identical with that of the light which formed the laminæ. He describes a number of experiments confirming his theory, but pushes it too far in attempting to explain the color of ordinary objects and the perception of color by the eye in this way.

His book is on the whole a most excellent résumé of the work done up to the time of its publication.

The appendix, in which the further development of the subject is treated by E. Tonn, deals chiefly with matters of theoretical interest. The work of Wiener and Lippmann is discussed in connection with the theory of the reproduction of mixed colors. As a matter of fact there have been very few or no developments since the time of Zenker, except along the lines indicated by Lippmann, and as no details of this process are given, the appendix is likely to be of interest to the physicist rather than to the photographer.

R. W. Wood.

BOOKS RECEIVED.

Grundlinien der anorganischen Chemie. Wilhelm Ostwald. Leipzig, W. Engelmann. 1900. Pp. xix + 795. 18 Marks.

Der Gesang der Vögel. Valentin Häcker. Jena, Gustav Fischer. 1900. Pp. vii + 102. 3 Marks.

Symons's British Rainfall, 1899. Compiled by H. Sowerby Wallis. London, Edward Stanford. 1900. Pp. 251. 10s.

Foundations of Knowledge. Alexander Thomas Ormond. London and New York, The Macmillan Co. 1900. Pp. xxvii + 528.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES.

SECTION OF GEOLOGY AND MINERALOGY.

At the meeting on May 21st, Dr. A. A. Julien presided and about twenty persons were present. Two papers on the rocks of Mexico were presented. The first was by Mr. G. I. Finlay, entitled 'A New Occurrence of Nephaline Syenite and associated Dikes in the State of Tamaulipas, Mexico, with a review of the distribution of these rocks in North America.' The second paper was a 'Contribution to the