tion was that no adaptation whatever exists in the *fovea* (retinal point of clearest vision). It is consequently blind to lights that are yet easily seen by adjacent regions, and all colors are seen by it as colors if seen at all. The relations of these observations to color theories the author has reserved for succeeding papers. It is to be regretted that M. Parinaud has not coördinated his work with that of von Bezold, Hillebrand, König, Christine Ladd Franklin and others, who have, one or another of them, made all or nearly all of these observations before. E. C. SANFORD.

SCIENTIFIC JONRNALS.

THE PHYSICAL REVIEW, VOL. III., NO. 2, SEPTEMBER–OCTOBER.

A Study of the Polarization of the Light Emitted by Incandescent Solid and Liquid Surfaces: By R. A. MILLIKAN. In spite of its important bearing upon the whole theory of radiation, the subject of polarization by emission appears to have been heretofore almost wholly neglected. As is pointed out by Dr. Millikan in the brief historical introduction to his own observations, no quantitative study of this subject has yet been made; and even qualitative observations appear to be rare. Having a clear field, Dr. Millikan has therefore undertaken a thorough investigation of the phenomenon. Experiments were first made in order to make certain that the effect is not due to refraction through the heated air at the incandescent surface. For this purpose a piece of platinum foil was brought to incandescence *in vacuo*. The light emitted showed the same degree of polarization as was observed when air was present. It thus appears that the polarization occurs within the radiating body.

Qualitative observations were next made upon a great variety of substances, in order to determine to what extent the phenomenon depends upon the nature of the surface. In all cases it was found that the polarization was in a plane perpendicular to the plane of emergence. Most metals showed a strong polarization, especially at grazing emergence; and provided the surfaces were not altered by oxidation, the behavior of molten metals was similar to that of solids. Non-metallic substances, such as glass and porcelain, showed the effect in less degree than did the metals. The transparency or non-transparency of the material appears to have little influence upon the amount of polarization observed. For quantitative observations the author used the polariscope of Cornu, an instrument quite simple in construction and yet capable of considerable accuracy. The present paper contains a discussion of the sensitiveness of the instrument, together with a few observations made with it; but the discussion of most of the quantitative work is postponed until the second half of the paper, which will appear in the November number.

Alternating Currents when the Electromotive Force is of a Zigzag Wave Type. By E. C. RIMINGTON. Of course no dynamo will give an E. M. F. curve of the zigzag form. Nevertheless when certain harmonics are present in unusual prominence this shape of curve is sometimes approached. Mr. Rimington has investigated the relation between current and electromotive force in an inductive circuit for the ideal case, in order to be able to predict roughly what will occur in practice. The mathematical methods used are novel, and results are obtained in such form as to be readily available for calculation. Perhaps what will most strongly appeal to the reader are the diagrams giving the curves of electromotive force current for certain assumed values of the resistance and inductance. Diagrams are also given for the case of an E. M. F. curve of the rectangular type.

On Ternary Mixtures. By W. D. BANCROFT. This is a continuation of an article begun in the July number, which has already been noticed in SCIENCE. Further abstract will be postponed until the article is completed.

On a Simple Method of Photographically Registering the Infra-Red Energy Spectrum: By KNUT ÅNGSTRÖM. In this paper are described two forms of apparatus for obtaining autographic bolometer records, the results achieved being similar to those obtained by Langley in his recent work on the infra-red solar spectrum. Dr. Ångström makes no attempt to improve upon the elaborate apparatus of Langley, the wonderful results of which he does not hope to equal. But, as he very truly remarks, "such

an instrument can only be obtained by a richly endowed laboratory." His object is, therefore, to simplify the method so as to bring the apparatus within the reach of laboratories of only moderate equipment. The method proposed can scarcely be described here. Tests made with it in recording the infra-red spectra of various flames, appear, however, to be satisfactory. The author's aim can perhaps best be stated in his own words: "To construct an apparatus which shall bear the same relation to that of Langley as does the direct vision spectroscope to the larger instruments of its class."

On the Electrolytic Conductivity of Concentrated Sulphuric Acid: By K. E. GUTHE and L. J. BRIGGS. The authors have determined the conductivity of strong sulphuric acid at different temperatures and concentrations, with especial reference to the concentration corresponding to the hydrate $H_2SO_4+H_2O$. Measurements were made by the bridge method with an alternating current, a sensitive dynamometer being used instead of a telephone. The results are given in tables, and also in the form of four curves, which show the relation between molecular volume and molecular conductivity at temperatures of 0°, 10°, 18° and 25°. Each of the four curves has a well-marked minimum at the molecular volume 32.1. If curves are drawn with concentrations instead of molecular volumes the minima do not occur at the same points. From this the authors draw the important conclusion that 'it is not the concentration but the molecular volume which determines the conductivity of the acid.' Interesting results are obtained for the conductivity of the crystalline hydrate $H_2SO_4+H_2O$. The values obtained are perfectly definite, and appear to be free from errors due to the presence of unsolidified acid. The conductivity is found to be much smaller than that of the liquid, even when the latter is undercooled. A rapid diminution in resistance is, however, noticeable as the temperature approaches the melting point (7°.5).

Book Notices. HELM: Grundzüge der Mathematischen Chemie. OSTWALD'S Klassiker der Exacten Wissenschaften. MACH: Popular Science Lectures. Proceedings of the Electrical Society of Cornell University. NABER: Standard Methods in Physics and Electricity criticised.

NEW BOOKS.

A Text-book of the Principles of Physics. ALFRED DANIELL. 3d Edition. New York and London. 1895. Pp. xv+782. $4.00.

The Great Frozen Land. FREDERICK GEORGE JACKSON. London and New York, Macmillan & Co. 1805. Pp. xviii+297. $4.50.

Climate and Baths of Great Britain. (Vol. I.) Being the report of a committee of the Royal Medical and Chirurgical Society of London. London and New York, Macmillan & Co. 1895. Pp. xvi+640. $6.50.

The Practice of Massage. A. SYMONS ECCLES. New York and London, Macmillan & Co. 1895. Pp. xii+377. $2.50.

The Theory and Practice of Counter Irritation. H. CAMERON GILLIES. London and New York, Macmillan & Co. 1895. Pp. xii+236. $2.50.

The Production of Tin in Various Parts of the World. CHARLES M. ROLKER. Washington. Government Printing Office. 1895. Pp. 88.

Handbuch der Physiologischen Optik. H. VON HELMHOLTZ. 2d Edition, Nos. 1–10. Hamburg und Leipzig, Leopold Voss. 1886–1895. Pp. 800.

Graduate Courses. Compiled by an editorial board of graduate students. New York, Macmillan & Co. 1895. Pp. vi+135. 25 cts.

Proceedings of the Royal Society of Victoria. Vol. VII., New Series. London, Williams and Norgate. 1895. Pp. vi+339.

The Psychology of Number. By JAMES A. MCLELLAN and JOHN DEWEY. New York, D. Appleton & Co. 1895. Pp. xiv+309. $1.50.

The Beginnings of Writing. WALTER JAMES HOFFMAN. New York, D. Appleton & Co. 1895. Pp. xiv+209. $1.75.

Frail Children of the Air. SAMUEL HUBBARD SCUDDER. Boston and New York, Houghton, Mifflin & Co. 1895. Pp. viii+279. $1.50.

Alternating Electric Currents. EDWIN J. HOUSTON and A. E. KENNELLY. New York, The W. J. Johnston Co. 1895. Pp. 225. $1.00.

The Stone Industry in 1894. WILLIAN C. DAY. Washington, Government Printing Office. 1895. Pp. 83.