

*Die elliptischen Funktionen und ihre Anwendungen.* Zweiter Teil. By Robert Fricke. Leipzig, B. G. Teubner, 1922. viii + 546 pp.

Almost exactly 171 years ago Euler was led to the discovery of the addition theorem for elliptic integrals of the first kind (*Institutiones Calculi Integralis*) by the researches of Count Fagnano. Hence Jacobi designated the 23d of December, 1751, as the birthday of elliptic functions. During this long period of development the most fruitful subject has been the theory of the transformations of elliptic functions. Enriched and organized by related fields, in particular by the theory of groups, the subject of elliptic functions as it appears today forms one of the most beautiful edifices ever erected by the human intellect.

The second volume of Fricke's treatise is devoted to the addition theorem and to the transformation theory. It has an introductory chapter of 155 pages containing concepts, definitions, and theorems from the theory of groups, algebraic functions, algebraic numbers, etc. The first part (131 pp.) deals with the addition theorem and the related multiplication and division theorems. The remainder of the book is devoted to the transformation theory.

The first volume appeared in October, 1915, and was reviewed for this BULLETIN (vol. 23 (1917), p. 319). The method of presentation and the underlying thought of the three volumes was there stated in some detail.

Volume II appeared in 1922, and maintains the characteristic Klein-Fricke style. Much use is made of geometry in picturing the behavior of groups by means of their fundamental domains. The book is clearly printed on excellent paper, and there are very few errors.

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*Fluoreszenz und Phosphoreszenz im Lichte der neueren Atomtheorie.* By Peter Pringsheim. Berlin, Julius Springer, 1921. 202 pp. 32 figs.

Although a few interesting analogies to the phenomena of fluorescence and phosphorescence exist in the theory of small vibrations, classical dynamical principles, applied to either the elastic solid or the electromagnetic theory of light, have never been successful in accounting for the observed effects. The reason for this is that these phenomena are dependent upon the emission and absorption of light, and, so far, only the newer quantum dynamics appears to offer the solution.

A comprehensive account of the important results in this field of research is contained in this small book by Pringsheim, together with indications of their interpretation with the aid of the quantum hypothesis. According to this, the effect of the incident light is to displace the electrons in the atoms from their normal orbits; on falling back into these the fluorescent light is emitted in accordance with Bohr's principle. No account is given of the related phenomena of thermo-luminescence, nor luminescence produced by other than light radiation.

Such a resumé of the newer work upon a fairly wide field of research is of very great value, particularly when done as well as this. A useful feature is a list of 266 articles bearing upon this subject that have appeared since 1908. For earlier work, reference should be made to the fourth volume of Kayser's *Handbuch der Spektroskopie*.

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