Siegel, I believe (if I am mistaken, I apologize), has said that the next great step in mathematical progress will be the burning of all books on mathematics. Should that somewhat spectacular step be taken, let us hope that Dickson's *Introduction* and a few other works of mathematical art escape.

E. T. BELL

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## THE NEW MECHANICS

*Einführung in die Wellenmechanik.* By Louis de Broglie. Translated into German by Rudolf Peierls. Leipzig, Akademische Verlagsgesellschaft M. B. H., 1929. iv+221 pp.

*La Nouvelle Mécanique des Quanta.* By George Birtwistle. Translated into French (and augmented by four appendices) by M. Ponte and Y. Rocard, with a preface by J. Hadamard. Paris, Albert Blanchard, 1929. vi+333 pp.

*Gruppentheorie und Quantenmechanik.* By Hermann Weyl. Leipzig, S. Hirzel, 1928. viii+288 pp.

About two years ago the new wave mechanics acquired remarkable experimental support through the discovery of the hitherto quite unknown phenomenon of diffraction of electronic streams by crystals. This discovery affords a genuine counterpart to the earlier discovery of the photoelectric effect, for the first shows that heretofore one aspect of the nature of matter has been left out of consideration while from the second it appears that one aspect of the nature of light had long been overlooked. It is now generally recognized that the behavior of light is corpuscular as well as undulatory; the diffraction of an electronic stream compels us to recognize that the behavior of matter is undulatory as well as corpuscular.

The older quantum theory failed to meet the dilemma of this two-fold character of light and of course did not consider at all the corresponding duality in the nature of matter; and it found no explanation of the presence of half quantum numbers in the formulas of the Zeeman effect and band spectra. A new theory was therefore inevitable. The first step was taken by Louis de Broglie in his dissertation (1924). The wave mechanics initiated by de Broglie received remarkable development at the hands of E. Schrödinger. Another line of development is due to W. Heisenberg.

De Broglie's *Wellenmechanik* furnishes the best introduction to the new quantum mechanics which has come to the reviewer's attention. A reader who desires to begin with a more elementary exposition would probably do well to use the second edition of *Materiewellen und Quantenmechanik* by A. Haas (1929); in this book the simpler aspects of the new theories are presented in an illuminating way. The exposition by de Broglie would then serve to complete an introduction to these most remarkable developments of the newer physics.

The starting point of de Broglie's wave mechanics has its origin in his purpose to develop the theory in such a way that there shall be an intimate connection between the conception of a corpuscle and that of periodicity in