SHORTER NOTICES

Einführung in die theoretische Physik. Von Clemens Schaefer. Band II, Teil 1. *Theorie der Wärme, Molekular-kinetische Theorie der Materie.* Berlin, Vereinigung wissenschaftlicher Verleger, 1921. x + 562 pp.

The first volume on mechanics (particles, rigid bodies and continua) when reviewed in these pages was signalized for its excellence of material and of style. The second volume continues the excellences of the first. The rest of the work will be awaited with interest, and, by those engaged in teaching theoretical physics, with impatience. It is a pity we cannot have such books in English. Twenty years ago there was hope that Andrew Gray's *Treatise on Physics* (of which vol. I, *Dynamics*, alone appeared) would fill this lacuna. Schaefer has written his present volume since the Armistice. He has been at Breslau and is now at Marburg.

There are eleven chapters as follows: 1. Heat conduction. 2. First Law of thermodynamics. 3. Second Law of thermodynamics. 4. Homogeneous systems. 5. Heterogeneous systems. 6. Special systems (gases and dilute solutions). 7. Chemical affinity and Nernst's theorem. 8. Kinetic theory of gases. 9. Entropy and probability. 10. Statistical mechanics. 11. Quantum theory.

The arrangement is logical. General old-fashioned theories of heat conduction and thermodynamics come first—general thermodynamics, be it noted, not the special idealized systems. The treatment of chemical affinity is more modern but at least in its main lines is now firmly established. The last four statistical chapters are excellent: no over-elaboration on ancient kinetic theory, a clear treatment of the fundamentals of statistical mechanics, and an excellent and convincing presentation of quantum theory so far as heat phenomena are concerned. Nothing is said of radiation—not even the Stefan law which sometimes is deduced from a Carnot cycle and could have been inserted in Chapter III as illustrative material.

The last few pages on Nernst's theory of the degeneration of ideal gases (Entartung) should have been omitted in a book of this kind. It is too special and not yet well enough substantiated either experimentally or theoretically (as the author notes). The space thus gained could well have been given to real gases, under which only van der Waals's equation is given, whereas for some not remote purposes other equations are useful; and for accurate descriptions of the behavior of substances over long ranges of temperature, pressure, and density, Keyes's equation is incomparably superior to van der Waals's.

Generally the mathematical treatment is elegant—not the elegance of the mathematical virtuoso, but that of the working physicist. (A notable exception is the painful summation, p. 502, of the series Σnx^n in place of its evaluation as the derivation of Σx^n multiplied by x.) In the main, physical concepts are kept well in the foreground throughout mathematical