Books

Action des Rayonnements de Grande Energie sur les Solides. By Y. Cauchois, J. Friedel, N. F. Mott, A. Herpin, J. Blin, P. Aigrain, H. Curien, G. Mayer, P. Perio, M. Tournarie, M. Gance, M. Lambert, A. Giunier, A. Chapiro, J. Uebersfeld. 139 pp. Gauthier-Villars, Paris, France, 1956. Clothbound 2.100 fr.; paperbound 1.800 fr. *Reviewed by R. Smoluchowski, Carnegie Institute of Technology.*

It seems that our present vogue of new series of books, monographs, and reviews of various degree of specialization and sophistication is finding its counterpart on the old continent. The present small volume is the first of a new series of monographs in physical chemistry edited by Miss Yvette Cauchois, professor at the Sorbonne. It is an outgrowth of a conference held in Paris in spring of 1955 under the same general title. It should be most welcome among all those who are interested in irradiation effects since it provides a very convenient and easy way of getting informed about the present thought and deed in France in this domain. From his own recent experience the present reviewer is fully aware of the great need for furthering such exchange of information between the two countries.

A brief introduction to the field of irradiation effects in solids by Y. Cauchois is followed by a survey of crystalline defects by J. Friedel. This excellent chapter, and also the longest one, treats in some detail the forthcoming book on dislocations by the same author. In a two-page brief note N. F. Mott discusses the possible interpretations of the very large number of atomic jumps necessary for the annealing of defects including the theory based on "crowdions". In a longer chapter A. Herpin gives a very clear summary of the theories of production of defects by irradiation, including the slowing down of fast particles by ionization, formation of displaced atoms by neutron collisions, etc. This is followed by a chapter by J. Blin describing the effects observed in metals, in particular the changes of resistivity and their annealing. A chapter by P. Aigrain surveys the irradiation effects in semiconductors, the threshold energy measurements, the annealing spectra, etc. H. Curien gives first a brief introduction to the thermal conductivity of dielectrics and indicates the typical effects observed in quartz, sapphire, and diamond. The effects produced in graphite, quartz, and lithium fluoride are described by G. Mayer, much of this being his original work. Also many original results pertaining to the x-ray study of the effects produced by irradiation are reported by G. Perio, M. Tournarie, and Miss M. Gance. They treat in particular detail the changes of lattice constant of LiF. Directly connected with this is the following paper by Miss M. Lambert and A. Guinier which concerns small angle x-ray scattering and curious streaks in x-ray diffraction patterns observed in irradiated LiF. This work is quite recent and not published elsewhere. In fact Guinier's experiments have been initiated and performed during the conference itself. An outline of the vast field of irradiation effects on polymers is given by A. Chapiro and the booklet closes with a survey of the paramagnetic resonance studies of lattice defects by J. Uebersfeld. Thus both for the beginner and for the advanced research man the booklet brings together much valuable material and basic information.

The reviewer cannot resist the opportunity to express his appreciation for the very kind hospitality and friendliness accorded him during his stay in France by his friends at the Sorbonne and at Saclay, nearly all of them being the co-authors of the booklet here reviewed.

Marian Smoluchowski. By Armin Teske. 278 pp. Polish State Scientific Publishing House, Krakow, Poland, 1955. About $6.00. *Reviewed by Mark Kac, Cornell University.*

Living in an era when almost every day brings news of a discovery of a new "elementary" particle it is hard to realize that it was not much more than fifty years ago that the very existence of atoms and molecules was the subject of a spirited and highly controversial debate.

Physics is by nature a rather conservative science. It tends to discourage speculations for the sake of speculating and it undertakes a revision of its principles with great reluctance and only when forced into it by a compelling necessity in a form of a major difficulty or paradox.

The criticism against the great work of Boltzmann was precisely that, apart from logical difficulties, it was pure speculation, contributing little to our picture of the world. A reviewer of Boltzmann's *Vorlesungen über Gastheorie* went even farther, writing in 1898: "The kinetic theory, as is well known, is as wrong as different mechanistic theories of gravitation. In particular, it envisages quite erroneously the principle of conservation of energy. If however someone wants to get acquainted with it let him by all means read Boltzmann." Ten years later, in 1908, the strongest opponent of atoms and kinetic theory, the famous Ostwald, capitulated and the discontinuous nature of matter became firmly established.

What happened during the ten years between the appearance of the second volume of Boltzmann's great book and the capitulation of proponents of the traditional thermodynamics is an exciting chapter not only in the history of physics but in the general history of scientific thought.

The phenomenon which finally raised the atoms from the realm of speculation into physical reality and low-