Nevertheless, a reviewer is confronted with the task of viewing a treatise in proper perspective or relation to the entire realm of which it is a part. Between the external world of visual objects and the accomplishment of seeing, and of the effects of this activity upon human behavior and welfare, lies the generally accepted realm of physiologic optics. Treatments of the latter touch so incidentally upon the external world of objects, brightnesses and colors that, with the exception of eyeglasses, the controllable factors which make seeing easy or difficult, certain or uncertain, are unduly submerged. This is also true of the human aspects and ends of seeing, for they are inadequately developed by incidental excursions into the realm of perception.

The practice of restricting the scope of treatises on physiologic optics, or of not giving at least a glimpse of the entire picture, is responsible for the widespread misconception that vision encompasses seeing. As a consequence, human beings living in a world built largely by and for seeing are paying unnecessary penalties for inadequate and improper seeing conditions, which can be corrected only by attention to seeing as well as to vision. This glimpse is not presented as a criticism but as a plea for the treatment of physiologic optics with the breadth, vitality and importance that the subject deserves as a formidable part of seeing. Other aids to seeing can be treated with the same justification as eyeglasses are. Concomitantly, glimpses are also justified of new knowledge pertaining to effects of seeing upon human beings, their performance and accomplishments, penalties and rewards. After all, vision is merely a link in a chain from the external world of visual objects to seeing and its end-products. Something can be done about vision, but much more can be done with the controllable factors in the external world which in turn greatly affect the end-products of seeing. As long as physiologic optics is treated as an isolated realm, the growth of a general understanding of seeing will be inhibited.

MATTHEW LUCKIESH,
Director

LIGHTING RESEARCH LABORATORY
GENERAL ELECTRIC COMPANY
NELA PARK, CLEVELAND, OHIO

THE STRUCTURE OF MATTER

Elasticity, Plasticity and Structure of Matter. By R. HOUWINK, Plastics Departments, N. V. Philips Gloeilampenfabrieken, Eindhoven, Holland, with a chapter on crystals by W. G. BURGERS. Cambridge, The University Press; New York, The Macmillan Company; 1937. Cloth, 5½ × 9 in., xviii + 376 pp., 214 fig., $6.00.

IN this work, modest in size despite the inclusiveness of its title, the author discusses the behavior of a wide variety of engineering and industrial materials under the action of stress and strain. The view-point partakes of that of the mechanical engineer, the atomic physicist and the industrial chemist, with a consequent interweaving of atomic theory and industrial test data in a most unusual manner.

In the first four chapters the author outlines the general problem of the stress-strain-time relationship of solids and viscous fluids and gives an indication of the experimental methods necessary for its investigation; then takes up the general theories of atomic and molecular structure, the solidification of matter by cooling, polymerization and the formation of gels, and the theoretical molecular strengths. There then follows, in more detailed fashion, a discussion of flow, viscosity, yield value, recovery after elastic and plastic deformation, high elasticity, rigidity and thermo-recovery.

In a fifth chapter, contributed by Dr. Burgers, the plasticity of crystals is covered in a comparatively thorough way. The stress-strain curve, strain hardening, annealing, theoretical strength and shear deformation are discussed with their relation to the crystal lattice, its deformation, its arrangement in polycrystalline aggregates and the propagation of slip through it.

The later chapters of the book cover specific classes of industrial materials, with considerable emphasis on the hypotheses of molecular arrangement, and yet with many references to industrial data and practices. Included in this treatment are the glasses, resins, asphalts, rubbers, cellulose products, proteins, doughs, paints, lacquers, clays and sulfur.

The entire work is characterized by a complete absence of dogmatism, and the reader must admire the frank way in which doubtful points are acknowledged. There is a wealth of quotations from and references to the developments of other research workers, and in fact one might almost class the book as a carefully edited symposium, or perhaps a review of current progress and thought, rather than a rigorous text or a practical exposition. In certain cases the conflicting views of different authorities are treated in such an editorial manner as to leave the lay reader not only with a feeling of respect for the open-mindedness of the author, but also with a feeling of helplessness as regards the solution of his own problem.

For the analytical philosopher specializing in any division of the field, the work should prove interesting and stimulating reading and helpful in broadening his view-point, but the student should not look to it as a text or the engineer to it as a reference book.

ROBERT W. VOSE

HARVARD UNIVERSITY