omy, although it touches all these subjects. However, the volume is not unworthy of a quick perusal. The author speaks with authority on a number of subjects of interest to an average citizen who, feeling the impact of science, wants to learn something about past attitudes toward science; in spite of its choppy style and structure, this book furnishes a pleasant way to gain such knowledge.

Unfortunately, the book has lost much accuracy and almost all citation of references in the translation. The 125 pages of text are divided into 14 chapters (most of which have numerous subdivisions): "The Sun's Teaching"; "The Host of the Stars" (*sic*) (the German title is *"Das Heer der Sterne"*); "The Dance of the Stars" (which deals with beliefs concerning the moon and the planets and was properly entitled *"Der Reigen der Gestirne"*); "Comets and Portents"; and so on. Some passages bear a strong resemblance to passages Zinner has published elsewhere. Moreover, he has used some of the illustrations before. But gathering together these bits of knowledge to make a new whole is worth while, and the illustrations are delightful and lend much charm.

In the German edition the bibliography is much fuller, each item is numbered, and references by item number and page are frequent in the text. This is not true of the English edition. In both, the bibliography contains many inaccuracies—names misspelled or misabbreviated. This is strange when one reflects that Zinner is the author of an invaluable tool—a bibliography of German astronomical literature during the Renaissance. And why are the title and date of the German edition (*Sternglaube und Sternforschung,* Alber, Freiburg und München, 1953) nowhere stated?

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The Vertebrate Visual System. Its origin, structure, and function and its manifestations in disease, with an analysis of its role in the life of animals and in the origin of man. Preceded by a historical review of investigations of the eye, and of the visual pathways and centers of the brain. Stephen Polyak. Heinrich Klüver, Ed. University of Chicago Press, Chicago, 1957. xviii + 1390 pp. Illus. $45.

I should say at once, since this book, more than most, is a highly personal document, that to my great regret my only contact with Stephen Polyak was a hasty handshake outside a waiting elevator. It was general knowledge that he had been dogged by illness through the last years of his life, and that throughout this period he labored ceaselessly to complete this book, the culmination of 30 years of work on the anatomy of the eye and the central nervous system. I gather that in all essentials he succeeded. At his death in 1955 the text, bibliography, and illustrations were complete. However, much remained to be done. That we have the book before us now, we owe largely to Heinrich Klüver's devoted editing. Subsidies from the Public Health Service and National Science Foundation have brought its cost down, within the reach of most libraries. Klüver arranged, corrected, indexed, and ordered, but apparently he subtracted nothing. The book is, in detail, as Polyak wanted it.

It is a very large work: 1390 pages (including 300 pages containing some 10,000 references) and 551 illustrations. Klüver tells us that the legends of the illustrations alone ran to 300 pages of typescript.

The book begins with a history of optics and investigations on the eye and its central nervous connections. Polyak had at his command a wide range of European tongues, ancient and modern, including Slavic, and he has much to say that is of interest in this realm. His historical review is distinguished particularly by its careful appraisal of early Arabic sources.

There follows a detailed examination of the anatomy and histology of the retina and the visual pathways, with particular reference to the primates, including man. This section of over 400 pages is Polyak's particular contribution —the compilation of his life's work. There is no doubt that workers in vision and general neurology will long remain in Polyak's debt for this material, and that, in its wealth of discriminating observation and its beautiful figures, it constitutes a monumental achievement.

There follows a relatively short section of 125 pages on the pathology of the retina and the visual pathways. This is in two parts—a general anatomical discussion and a second, clinical section which contains the description of 12 specific cases involving disturbances of visual field and discussing the underlying pathology.

The book ends with a section of about 300 pages on the origin and development of the vertebrate eye, the natural history and behavior of 11 specific animals, and the role of vision in the origin of man and civilization.

Stephen Polyak was a learned, skilful, resourceful anatomist, and all of us admire and are grateful for his contributions in this field and the devotion with which he pursued it. From his anatomical studies he drew inferences in physiology, paleontology, anthropology, and ethnology. In my opinion, all such excursions ended unhappily. It is possible to infer basic visual physiology from anatomy, as Max Schultze long ago showed, and our classic theory of evolution springs almost wholly from anatomical observations. But this is not where Polyak's gifts lay. The concluding chapter and the strange "Epilogue" have everything in them: a little concerning vision, some genuinely interesting observations in natural history, a great deal that is trivial, and much that is preposterous. I wish that this last section of the book had never been written, or, if written, not published, or, if published, not in a book on vision. It must have given trouble to Klüver, and it will give trouble to any reader aware of Polyak's gifts and accomplishments as a neuroanatomist.

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Solid State Physics. vol. 4. *Advances in Research and Application.* Frederick Seitz and David Turnbull, Eds. Academic Press, New York, 1957. xiv + 540 pp. Illus. $12.

As in earlier volumes of the series, the excellent articles in this new volume are on widely diverse topics. They are, however, uniformly well written and authoritative and will be very helpful to those wishing to become familiar with new fields. The first article is a comprehensive survey of known facts about ferroelectric and antiferroelectric crystals, by Werner Känzig. The author reviews the present status of theory and the known phenomena in both kinds of materials. Next, the theory of electron mobility in solids is discussed by Frank J. Blatt. The Boltzmann transport equation is used in the study of electric and thermal conductivity, thermoelectric effects, and the Hall effect. After treatment of the simplest possible models, more complicated cases are discussed, including models involving nonspherical energy surfaces and nonisotropic relaxation times.

The next article, by Truman P. Woodruff, is a short discussion of the orthogonalized plane wave method for obtaining electron wave functions in a crystal lattice. The method is carefully described, and its applications by the principal investigators in the field are discussed and compared. There follows a bibliography, by Robert S. Knox, of atomic wave functions. References are given to results for more than 100 atoms and ions, with brief descriptions of the calculations included. The final article discusses techniques of zone melting and crystal growing. This article, by W. G. Pfann, will be of great interest to those who wish to learn of recent advances in these arts.

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