Book Reviews

Our sun. Donald H. Menzel. The Harvard Books on Astronomy. Philadelphia: The Blakiston Company, 1949. Pp. 326. $4.50.

One of Dr. Menzel's principal contributions to astrophysical thought has been his insistence, often in the face of opposition, that the stars must not be regarded as static formations, but rather as turbulent masses of gas whose outer layers are constantly moving about in different directions, giving rise to tremendous prominences, extended atmospheres, coronas, and various types of corpuscular radiations. His new book on the sun shows why he has maintained this picture of a star. There is every reason to believe that the sun is not unusual and that its prominences, spots, flocculi, and flares are regular properties of most stars.

The book is full of useful and up-to-date information. The first eight chapters describe the various features of the solar surface, including recent developments in infrared spectroscopy at the University of Michigan and elsewhere. The problem of the spicules recently discussed at the Harvard High Altitude Observatory in Climax is treated in detail, as are also the new results on prominences derived by means of moving picture cameras.

Chapter 9 is an account of the corona and gives a thorough discussion of Edlén's identification of the coronal lines and of Lyot's work on the shape of the corona. There is a section devoted to the solar radio noise, and a discussion of the theoretical implications of the high temperature of the corona.

Chapter 10 discusses the structure of the interior of the sun and the now generally accepted ideas of the source of the solar energy. Only one page is devoted to the origin of the solar system, probably because this topic was previously discussed by F. L. Whipple in his book *The earth, moon and planets*—another issue of the Harvard series.

Chapter 11 deals with the eclipses of the sun and records many personal experiences and observations of the author. Incidentally, the results of Van Biesbroeck's measurement of the relativity shift in 1947 have been known for some time. The value, as published in the *Astronomical Journal*, No. 1175, page 71, 1948, is $2.01 \pm 0.18''$.

The last chapter is devoted to those terrestrial effects which are correlated with solar phenomena. The illustrations are numerous and are exceptionally good, but Fig. 149, showing the Doppler effect of the recession of the spiral nebulae, although often used in various recent publications, is so heavily retouched that it gives an altogether erroneous impression of the spectral lines. The curve of growth shown in Fig. 59, although copied from another publication, is grossly misleading and should certainly be replaced by a more accurate diagram when this book is revised for a second edition.

Most readers will be surprised that Hale's great work on the sun is comparatively little recognized. For example, his invention of the spectroheliograph is dismissed in two sentences, and the enormous productivity of his own research and of that of his associates at the Kenwood, Yerkes, and Mount Wilson Observatories has not been accentuated, but has rather been submerged in the great mass of more recent advances. Despite these minor criticisms, the book is an important addition to the astrophysical literature. It is primarily intended for the amateurs, but professional astrophysicists will also find it a valuable and interesting summary of modern solar physics.

OTTO STRUVE

Yerkes Observatory

Embryology. Lester George Barth. New York: The Dryden Press, 1949. Pp. viii + 330. (Illustrated). $5.00.

In the pedagogical realm, no science deserves more or has received less from its practitioners than embryology. No biological field offers more drama and excitement than the one which treats of the transformation of a simple, tiny egg into a complex being. Yet most textbooks of embryology in use today are calculated to give the student the impression that embryology is the deadest of the sciences. It is a pleasure to record that this situation has just been altered by the appearance of a college-level text in which development is analyzed as well as described. The book is *Embryology*, by L. G. Barth of Columbia University.

The book opens with a brief but compelling statement of the problems of embryology. The viewpoint indeed is primarily analytical throughout. For example, the experimental work on the make-up of the unfertilized egg, on gastrulation and the organizer, and on the gradual differentiation in the neurula stages, is dealt with before the actual development of the frog's egg is described. Moreover, although there are chapters specifically devoted to the traditional chick embryo and to the mammal, the author also draws on hydroids, flatworms, and echinoderms where they are useful in illustrating principles.

The order of topics is roughly chronological, beginning with ovulation and proceeding to the later phases of development, where the several organ systems are considered separately. In addition to the material conventionally treated in embryology texts, however, this book also deals with fertilization, regeneration, growth, sex differentiation, and embryonic physiology. In all cases an analytical approach is adopted wherever the material allows it, the tone throughout being critical and inquiring. The style, moreover, is clear and terse. It will be a poor student indeed who is not stimulated by the whole presentation.

Prof. Barth has no doubt done a brilliant job of reporting on an extremely broad field. In too many places, however, the coverage is superficial. Thus the difficult subject of avian gastrulation is dealt with in less than a page and a half, with no adequate illustrations; the visceral pouches are dismissed as "five evaginations from the side walls of the foregut"; embryonic excretion is glossed over in 160 words. Such superficiality particularly afflicts the descriptive sections, for the reason, the author says, that "the details of comparative and descriptive embryology are of specialized interest"! Why experimental embryology is less specialized than descriptive he does not explain, nor does he make it clear by what sort of transmigration a true understanding of experimental problems is to be conveyed into minds with the slipshod grounding in morphogenesis that he proposes.

But the principal weakness of the book lies in the illustrations. The line drawings range from poor to grotesque. At best they are too schematic; at worst they are the sort of graphic enigmas that can be resolved only by a practiced eye—and not always by that. Many are ill-proportioned and inaccurate in detail. It is difficult to see how the importance of exactness in observation and recording is to be impressed on students if they find such sloppy work in print. There are numerous photographs, but most of these are not very clear, despite the use throughout of glossy coated stock that makes the book hard to read. The detailed descriptive captions, however, are generally excellent.

That the book has shortcomings I record with regret, and in the hope that they will be corrected in a second edition. For the work is a most valuable contribution to the teaching of embryology. No other text comes close to it in laying before the undergraduate student the living, growing body of knowledge that is embryology.

FLORENCE MOOG

Washington University

The theory of solutions of high polymers. A. R. Miller. New York: Oxford Univ. Press, 1948. Pp. vi + 117. $3.25.

This small volume treats a very timely and important subject in a highly scientific and thorough manner; it is not a book for a man who wants to get a first general idea of the matter but it is an excellent, up-to-date presentation of our present ideas of the nature of macromolecular solutions and the modern ideas and mathematical methods used to represent their behavior in a quantitative manner.

After a short introduction dealing with the principles of statistical mechanics and a little information on the most important properties of macromolecules, the author proceeds to treat his main subject—namely, the statistical treatment of flexible long chain molecules in athermal solutions. This is done in a rigorous and general manner, yet the text always has great clarity and convincing simplicity.

A chapter on comparison of theory with experiment and another on treatment of solutions with appreciable heat of mixing complete the presentation of our present-day knowledge. A very stimulating chapter on possible extensions of the theory concludes the book, which is a valuable addition to the scientific literature and a masterpiece of clear and concise writing.

H. MARK

Polytechnic Institute of Brooklyn

Motor performance and growth: a developmental study of static dynamometric strength. Harold E. Jones. Berkeley and Los Angeles: Univ. California Press, 1949. Pp. x + 181. (Illustrated.) $2.00 paperbound, $3.00 cloth.

This painstaking research study is one of the few longitudinal studies in which the same individuals have been measured biannually from the 6th through the 12th grade, 11 to 17.5 years of age. The primary data include 139 middle-class students, divided about equally as to boys and girls from five elementary schools of Oakland, California. The measures consist mainly of static right and left grip, push and pull *dynamometer strength.* The significance of strength is shown in the large coefficients of variation during the adolescent growth spurt, these being greater than for any other physical or psychometric measures. The testing procedures are judged to have been good, since the reliability coefficients were .938 or above for the boys and .901 and above for the girls.

The selection of tests was dominated by convenience. Higher validities may be shown for the net contribution of leg strength to all-around athletic performance (Rogers' Montclair High School Data) and the superior validity of the dynamic tests over the static type is frankly acknowledged. Correlations are quoted from Espenschade's work (1940) to show that right grip and total strength correlate .50 and .34, respectively, with a track dash, .44 and .56 with the broad jump, .53 and .62 with a distance throw; low correlations of .27 and .29 are quoted for relationship to the jump and reach test and insignificant correlations are shown for the Brace motor ability test. To some considerable extent the book is a collaboration of several articles published in educational journals. Whereas total strength correlated .39 with age, .50 with skeletal age, .65 with height, .30 with popularity, .21 with good looks, insignificant correlations are shown for intelligence and socioeconomic status. Other authors (Bower, Jersild, Dimock) are quoted to sustain the role of strength in social leadership (reputation) and in athletics (Rogers, McCloy, Cureton).

As a whole the study confirms, on the basis of four types of growth causes, the studies of others to verify the prepubertal lag followed by the growth spurt, the differences between boys and girls after 13 years of age, and variable patterns of growth for early contrasted with late maturing cases. Tables of strength are given for each half-year of age from 11 to 17.5 years. Jones concludes that strength is superior to the shock creative test, the Crampton pubic hair method, or any other known method. It shows that early maturing boys and girls usually have greater total strength but in the early maturing girls there appears to be an arrest of growth that