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

does not develop in the boys. The finding that the greatest growth for both boys and girls occurs in April and the least in October seems real but it is not well explained. This is in direct opposition to the findings in various weight studies, which show the greatest increase in the second half of the year.

The generalizations of the author as to educational implications are dominated by the belief that strength is almost wholly inherited and little credit is given to developmental or environmental influences. The author seems to have some prejudice against intensively competitive games and athletics in general, which is unsupported by data. The positive aspects of guidance are relatively undeveloped, although opinions and inferences abound in the final chapter which go beyond the meaning of the data, since no methods for developing strength have been tested.

THOMAS K. CURETON, JR.
University of Illinois, Urbana

Fieldbook of natural history. E. Laurence Palmer. New York: McGraw-Hill, 1949. Pp. x + 664. (Illustrated.) $5.00.

"Professor Palmer's *Fieldbook* is an extraordinarily comprehensive guide to natural history. Simply presented, and profusely illustrated, it embraces more than two thousand items—birds, fish, plants, rocks and minerals, the stars, mollusks, reptiles, and mammals. Each item is illustrated with a detailed drawing or photograph for quick and correct identification, and for each there is a descriptive paragraph, followed by data on range and location, life history, ecology, and economic importance. An unusual feature of the book is its inclusion of many domesticated and economically important species not usually found in books of this kind."

This quotation from an advance notice released by the publisher of the *Fieldbook* proves to be an accurate description. Here is encyclopedic information about a wide variety of subjects. It bids fair to become one of the most frequently used books on the desks of teachers, high school and college students, naturalists, game managers, game protectors, gardeners, nature lovers, sportsmen, and citizens generally who want to know something about their surroundings. The book should give a real impetus to efforts toward conservation education.

One doesn't have to be a specialist to use this book. Technical terms have been avoided. But the information is exact and can be referred to in its place in the taxonomic scale.

Most useful will be the drawings. While this book lacks conventional keys (which ordinarily cannot be used except by specialists anyway) there are hundreds of distinctive line drawings so that identification of plants, birds, or insects should be a comparatively simple matter. It is true that some of the outlines do not look just right, but this applies to few, and is by no means strange in view of the comprehensive coverage of the work. If colors could have been used the illustrations would have been somewhat more useful.

This reviewer has often wondered why, in our books on mammals and other species, we should not include the domesticated varieties, including man (although perhaps it is stretching a point to call man domesticated!). The *Fieldbook* does this, with excellent results.

Unfortunately, the author follows the American Ornithologists' Union Check-List in the use of the possessive, as "Gambel's quail" instead of the Gambel quail—as strained a usage as it would be to say "Vancouver's Island" or "Rainier's Mountain." The author cannot be too much blamed, however, since probably the majority of usage in ornithology, at least, follows this cumbersome practice.

In a work covering so large a field in natural history, it is inevitable that omissions should occur. Among these we note the absence of bicolor lespedeza and multiflora rose among plants. Since so many gardeners and game managers all over the country are concerning themselves with these species, with a zeal that smacks of a full-fledged fad in wildlife management, there are sure to be information-seekers who will be disappointed not to find them in this volume. But in general the material has been well selected and one would be captious indeed to press this comment.

The book is typographically attractive and accurate. Furthermore, it is equipped with a complete index which will greatly facilitate its use.

Another virtue of this book is that it is authoritative—experts have checked the facts. This is unlike some other recent works whose authors appear not to have taken the trouble to check their information with specialists.

The *Fieldbook of natural history* represents another major contribution from the splendid Cornell group of scientific leaders among whom the Comstocks, Needham, Bailey, the Wrights, Allen, and Hamilton are included. The volume is a great credit, both to the author and to the publishers. Furthermore, the reviewer cannot forbear to mention the price. Five dollars for this book of 664 pages is not only astonishing, but gratifying. The job is a public service which ought to be appreciated by all and will be by many.

W. P. TAYLOR
Stillwater, Oklahoma

Theory of oscillations. A. A. Andronow and C. E. Chaikin. (Solomon Lefschetz, ed.) Princeton, N. J.: Princeton Univ. Press, 1949. Pp. ix + 358. (Illustrated.) $6.00.

The original version of this book was published in Russian in 1937, and parts of it were included in Minorsky's *Introduction to non-linear mechanics*, first published in the David Taylor Model Basin Reports during the war. It is concerned with oscillations in autonomous systems, in particular systems representable by equations of the form

$$\dot{x} = P(x, y), \quad \dot{y} = Q(x, y), \tag{1}$$

including the second order equation $\ddot{x} + x = \mu f(x, \dot{x})$, which is reduced to (1) by putting $\dot{x} = y$. These equations are treated mainly by considering the path of the representative point in the x, y or *phase* plane, using the Poin-