fiber tract cannot be recognized, nor are they indicated. This criticism applies with even greater force to the treatment of most of the line drawings that are included in the appendix. Finally, the usefulness of the text and the bibliography is materially limited because neither was brought up to date; for example, references to Fulton's *Physiology of the Nervous System* are to the 1938 edition, and those to Howell's *Textbook of Physiology* are to the 1922 or eighth edition. No reference is made in the chapter on the hypothalamus to the work of Wislocki or to the work of Harris and Green on the hypophyseal circulation; and none is made to the problems of temperature regulation, obesity, and energy exchange, which are focal points of so much recent work on this region. These omissions and others of similar character seriously limit the usefulness of this book.

DONALD H. BARRON
Yale University

The Origin of Vertebrates. N. J. Berrill. Oxford Univ. Press, Oxford, 1955. viii + 257 pp. Illus. $4.

From about 1875 through the 1920's, the origin of the vertebrates was one of the active subjects of evolutionary biology. Then discussion died down from lack of fuel. All the available evidence seemed to be in, and all together was insufficient to warrant much more than a verdict of "not proved." Hardly any new evidence is at hand today, and yet there is room for a reconsideration of probabilities with more perspective than was available when discussion was at its height. As Berrill emphasizes, any hypothesis of vertebrate origin is still speculative, but his exercise in speculative logic, tied to a wealth of detailed observation of indirectly pertinent facts, is well worth while.

Perhaps the most generally accepted (or, at least, repeated) hypothesis has been that of Garstang which was published in final form in 1928 and which stemmed from Willey's views of 1894. According to that view, the ancestral hemichordates and the echinoderms had a common origin. Tunicates arose from ancestral hemichordates and then the vertebrates arose by neoteny from the tadpole larvae of tunicates. The first two-thirds of that hypothesis, emphasized by many students almost to the exclusion of the last third, are now flatly rejected by Berrill. He does not believe that the hemichordates (a name he considers incorrect) are especially related either to the echinoderms or to the true nonvertebrate chordates (tunicates and lancelets). He does agree that in some vaguer sense the grouping of echinoderms, "hemichordates," nonvertebrate chordates, and vertebrates is probably natural, but this casual statement is mysterious because any actual evidence for it seems later to be confuted.

Concerning the vertebrates, Berrill agrees in essence, although not in detail, with the last part of Garstang's hypothesis. The tunicates arose as a group of sessile food-strainers. Tadpole larvae later evolved among the tunicates as an adaptation enabling the animals to settle on a suitable substrate. Neoteny in some of those larvae gave rise to animals free-living and -swimming throughout life. Such neotenous ex-larvae then evolved on the one hand into the degenerate lancelets and on the other into the first true vertebrates (Agnatha). A shift from marine to freshwater environments was supposedly a crucial factor.

Such a brief statement of the thesis does scant justice to an argument that is detailed, eloquent, and imaginative. The author's own characterization of his book as "in a sense . . . science fiction" is justified to the extent that this work, although it is technical enough and honestly linked with factual data, is a rare sort of scientific entertainment. Berrill's last sentence is, "Proof may be for ever unobtainable, and it may not matter, for here is such stuff as dreams are made on." *Perhaps* this is the last word on the chordate ancestry of the vertebrates. As for the ancestry of the chordates, all is left in darkness without even the dream of 60 years ago.

G. G. SIMPSON
American Museum of Natural History

The Quantitative Analysis of Drugs. D. C. Garratt. Philosophical Library, New York, ed. 2, 1955. xv + 670 pp. $17.50.

This volume is a carefully prepared compendium of selected methods for the chemical analysis of drugs. Details are adequate for conducting an analysis, and appropriate literature citations are included. Throughout it is evident that the selections have been based on the author's wide experience with procedures of this type. Regrettably, this work suffers from a high proportion of older methods, and some important current methods are omitted. There is no mention, for instance, of the fluorometric determination of epinephrine or of the spectrophotometric methods for barbiturate analysis. The necessity for brevity has prevented any elaboration on the chemical reactions involved in these procedures, and the presentation is usually in the nature of empirical directions.

Many of the drugs are strictly identified with the past generation and have little significance under present conditions of medical practice. This is indicated in a ten-page supplement, which in large part is a list of the drugs described in this volume that have been deleted from the 1954 *British Pharmaceutical Codex*. The British drug nomenclature, particularly in the case of newer drugs, may prove confusing to some in this country, since no synonyms, therapeutic applications, or structural formulas are given.

R. P. WALTON
Department of Pharmacology, Medical College of South Carolina

Vascular Plants of Illinois. G. Neville Jones, George D. Fuller *et al.* Univ. of Illinois Press and Illinois State Museum, Springfield (Museum Scientific Ser. vol. 6), 1955. xii + 593 pp. Illus. $10.

"Those who may be unfamiliar with botany" write the authors of this book, "often take for granted that the floras of the world are more or less completely known and have been fully and accurately accounted for in existing botanical literature . . . the study of plant populations, particularly from floristic, ecological, and phytogeographical standpoints, [still] presents many fascinating opportunities for scientific investigation in almost any part of the world, and by no means least interesting is the flora of the great Mississippi Valley of North America, part of which includes the richly endowed state of Illinois." The authors clearly recognize that "No report on a flora is, of course, ever complete. Even now, the plants of Illinois are imperfectly known."

This handsome volume, except for its double-column format and different style of printing, is at once reminiscent of Deam's *Flora of Indiana*. It is difficult to think of a better model. The use of small state-county dot maps to show distribution, the inclusion of a full-page vegetation map, a brief description of the flora and vegetation, an account of the principal collectors, and a full bibliography are a few of the laudable similarities between the two. Jones and Fuller depart from their model principally in omitting all keys and a glossary, in emphasizing full synonymy and recording all published references to Illinois plants, and in stressing orders while abjuring varieties and forms. I agree with the use of the standard Englerian sequence of families and orders. Since the authors recognize its artificiality, however, it may be questioned whether there is any value in trying to "modify" it into conformity with assumed phylogeny.

Deam's *Flora of Indiana* very clearly stems from its author's 40 years of field work in his state and has a distinctly per-

sonal flavor. By contrast, this book on Illinois flora is quite impersonal and is presumably based on the examination of a larger number of specimens. In terms of kinds of plants in the two states, the figures for Indiana are 141 families, 690 genera, and 2140 species (16 percent introduced); for Illinois, 156 families, 785 genera, and 2450 species (approximately 25 percent introduced). So far as one may judge by a hasty check, the figures are fairly comparable.

The authors remark that "The science of taxonomy consists also of intensive studies of the plants of a definite area for the purpose of clarifying our knowledge of these plants including attempts to shed light on the origin and evolution of species and their inter-relations with each other." Of the 18 nomenclatural combinations proposed, it is interesting to note that 11 are putative hybrids, perhaps suggesting a trend in future taxonomic studies for which this valuable book will form a solid basis.

LINCOLN CONSTANCE
Department of Botany,
University of California, Berkeley

New Books

Atomic Physics. An atomic description of physical phenomena. Gaylord P. Harnwell and William E. Stephens. McGraw-Hill, New York, 1955. 401 pp. $8.

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Environmental Hygiene. vol. II of *Preventive Medicine in World War II.* Ebbe Curtis Hoff., Ed. Historical Unit, Army Medical Service, Washington, 1955 (Order from Supt. of Documents, GPO, Washington 25). 404 pp. $3.50.

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Introduction to Modern Physics. F. K. Richtmyer, E. H. Kennard, and T. Lauritsen. McGraw-Hill, New York, ed. 5, 1955. 666 pp. $8.50.

The Atomic Nucleus. Robley D. Evans. McGraw-Hill, New York, 1955. 972 pp. $14.50.

Organic Insecticides. Their chemistry and mode of action. Robert L. Metcalf. Interscience, New York–London, 1955. 392 pp. $8.50.

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(Inquiries concerning these publications should be addressed, not to Science, *but to the publisher or agency sponsoring the publication.)*

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