over, the author's method casts into bold relief a very important theme: what Sir Basil calls "[t]he process of mathematization of the laws of nature, the replacement of physical concepts by mathematical symbols." To quote Synge, "The robust body of the Cheshire cat was gone, leaving in its place only a sort of mathematical grin." The atrophying of physical concepts, the "aphasia of mathematics" as Kelvin put it, was indeed a source of concern to many British physicists of the last century, and emphasizes the gulf between their day and ours.

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Survey of Genetics

Genetics. MONROE W. STRICKBERGER. Macmillan, New York; Collier-Macmillan, London, 1968. x + 868 pp., illus. $12.95.

The opinions offered here of Strickberger's book were formed from two vantage points: doing genetics and teaching genetics. In general the book should prove useful to the gifted beginning student, to intermediate undergraduate and beginning graduate students, and to teachers of genetics whose background and time prohibit continuous updating.

In explaining this general conclusion let me say first that like most general textbooks this book suffers from the author's attempt to be both comprehensive and broad in scope; the good chapters display his interests and competence, and the weak chapters his lacks thereof.

Strickberger's treatment of "classical" genetics is thorough, and most likely the best treatment of the subject to be found in a general textbook, but some of the interspersed, "nonclassical" chapters are correspondingly weak. For example, the chapter on cytoplasmic (maternal) inheritance is superficial, out of date, and misleading in that it strives for solutions to non-Mendelian problems via the Mendelian approach. Most of the examples used to illustrate cytoplasmic inheritance can be found in older, less comprehensive textbooks; only brief mention is made of the fact that mitochrondria, chloroplasts, and other organelles possess DNA and RNA (that is, their own hereditary information); and no mention is made of the presence in these organelles of unique ribosomes, amino acyl synthetases, transfer RNA's, and so on (unique protein-synthesizing machinery). As a consequence of this omission the author bypasses the opportunity to explore the interesting and profound means for assaying cytoplasmic inheritance, and the equally exciting relationships between organelle and bacterial heredity. Other examples of this kind of weakness (in the chapter on nucleic acids, RNA is mentioned only in passing) will be apparent to specialists in the various areas of nonclassical genetics. For this reason the book will be of limited usefulness to the professional geneticist.

For the teacher who is not a professional geneticist the book will be of value as a means of fortifying his background beyond the depth of the more usual textbook, but I question its usefulness for his beginning students. The book demands a prior interest in genetics; it is too professional for the general student. Gifted students headed toward a career in biology will find the chapters on Mendelian, quantitative, population, and evolution genetics a gold mine of information, but in other chapters the students will need to go to the original sources (as one example, the descriptions of *Neurospora,* in the chapter describing life cycles, were taken from another textbook, not from Beadle or Dodge; in such cases, and there are many, the book merely translates errors from one textbook to another). In short, some chapters seem too difficult for beginners and others too superficial for the serious student.

In a day when textbooks are yielding to the monograph and *"Scientific American* offprints," when new information is a daily experience, and when teachers are shying from methods involving memorization-regurgitation and canned questions, a textbook must be expected to convey excitement and generalizations, as a minimum requirement, and at the same time it must leave a platform from which the teacher can function effectively. Strickberger's book is not first-rate judged by these criteria.

The author has made himself familiar, in a detailed way, with many important areas of genetics and has presented these in a readable way for the initiated, but to capitalize on these admirable efforts for maximum usefulness to students I would suggest an organization along the lines of Hayes's *The Genetics of Bacteria and Their Viruses,* such that the beginner might see the big picture before getting into deep water.

I think the science of "genetics" has grown too large for detailed treatment in a beginning textbook, and probably too large for detailed treatment by one author. Much of my criticism of Strickberger's book may stem from the fact that he would not agree with me on these points. Apart from my criticisms, this book is not just another textbook of genetics but rather a pandect of Mendelian, quantitative, population, and evolutionary genetics.

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Developmental Botany

Morphogenesis in Plants. A Contemporary Study. C. W. WARDLAW. Second edition. Methuen, London, 1968 (distributed in the U.S. by Barnes and Noble, New York). 451 pp., illus. $14.50.

The scarcity of published books on plant morphogenesis is not surprising considering the often ill-defined and all-encompassing nature of the field. An author attempting to discuss the origin of form in plants and its experimental control not only sets an extremely high goal for himself but also must proceed towards that goal without benefit of any generally accepted outline of formalized and structured subject matter. Wardlaw emphasizes that for a satisfying account of morphogenetic phenomena "we must draw upon the whole corpus of botanical knowledge and of the physical sciences; and, not withstanding the difficulties, which are admittedly great, we must attempt to unify and to integrate our information." As a consequence of the extensive scope of plant morphogenesis, the approach taken and the material included in most available books concerned with organization and development in plants are highly individualistic. The book reviewed here is no exception. The reader is exposed to a very personal and somewhat restricted account of plant morphogenesis. Like its predecessor (published in 1952), this edition contains accumulated results of observations and experimentation from Wardlaw's laboratory and does not lack adequate discussion of the author's concepts of apical organi-