be useful to students and teachers of general courses. But if this sort of use were the objective of the book (which it is not) the reader would demand a more detailed exposition.

A merit of the book is the emphasis it places upon the importance of variety among the living things of natural communities. This argument, which embodies one of the most important conceptual emphases of modern ecology, is illustrated by a number of good examples. A related undercurrent concept which struggles to come to the surface throughout the book, but which never quite makes it in any concrete form, is that active continuance of conflict is necessary for maintaining the balance and integrity of higher levels of organization. A proffered integrating suggestion that conflict per se is necessary for the evolution of variety receives no more systematic support here than does the opposite possibility that the most permissive environments tolerate the greatest diversity of organisms simply because they present fewer obstacles to their continuance.

The professed purpose of this book is to give a new theme to the process of adaptation of animals to their environment—to offer "an original . . . exposition of the hypothesis [in some places "general law"] that animal conflict is inevitable and necessary." Conflict is viewed in a broad sense as the result of any lack of fit between an organism's needs and the offerings of its physical or social environment, and is considered the inevitable consequence of change, which itself is considered inevitable. Conflict is considered necessary because it leads to adaptation to the environment and hence favors survival. As it has been presented at its best, at one level, this concept is hardly new; it was advanced by Charles Darwin. As it is presented here it has the potentiality of becoming something new and substantial, but unfortunately it is supported largely by arguments that are circular, poorly organized, lacking in logical rigor, and based upon terms that are poorly and variously defined.

A clearer and more rigorous statement of the intended concept may appear in the future. I hope so, for the general problem to which the book is addressed is not only extremely difficult conceptually but very important.

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Fundamentals of Genetics

Alfred Barthelmess's **Grundlagen der Vererbung** (Akademische Verlagsgesellschaft Athenaion, Konstanz, 1965. 380 pp., illus.) has recently appeared as parts 19 to 35 of volume 3 of the extensive *Handbuch der Biologie*. It is a synthetic and systematically organized account of the classical foundations of genetics and cytogenetics.

The exposition of the principles of genetics follows the divisions established by Barthelmess in his *Vererbungswissenschaft* (1952): (i) *Idiogenetik*, derived from Naegeli's *Idioplasma*, and including the totality of the hereditary material both in nucleus and plasma (272 pp.); (ii) *Phänogenetik* (82 pp.); and (iii) *Phylogenetik* (7 pp.). As can be seen from the amounts of space allotted to the different topics, this is primarily a review of the transmission system of heredity, based mainly on older work but ending with a succinct account of the fine structure and chemical constitution of the hereditary material.

Special features are the extensive review of both old and new work on what Barthelmess calls "non-gametic inheritance" (*agame Vererbung*). This covers the behavior of the nucleus and the various organelles (spindle, centrosomes, kinetosomes, blepharoplasts, plastids, chondriosomes, Golgi apparatus, endoplasmic reticulum vacuoles, microsomes, ribosomes) during cell division. Well-chosen and well-reproduced photographs and drawings make this a good supplement for use in elementary courses in cytology. It includes descriptions of organelles and cell division in microorganisms not usually found in textbooks of genetics.

A section on amphimictic inheritance is less extensive (52 pp.) and includes equipping the gametes with nuclei, centrosomes, and the other organelles transmitted through egg or sperm or both. The details of meiosis are illustrated with material from both plants and animals. This section includes such classical cases as Wilson's analysis of the distribution of chondriosomes during spermatogenesis in scorpions.

A third major division of *Idiogenetik* is concerned with analysis of the genome by breeding experiments and includes an extensive review of cytogenetics and an equally extensive analysis of the extranuclear idioplasm, the plasmon, which is excellently illustrated largely from the classical work of German botanists. A concluding section summarizes the components of the genetic system, with an attempt (not entirely successful in my opinion) to devise an orderly classification of all elements transmitted through either nucleus or cytoplasm. This is followed by a brief account of the structure and transmission of DNA and its relation to protein specificity.

The chief account of gene-directed protein synthesis occurs in the section devoted to phenogenetics. The book concludes with a brief and inadequate account of phylogenetics.

It is obvious that the chief purpose and value of the book is its concern with the transmission system. The emphasis on the plasmatic elements, as might be expected from a botanically oriented biologist, greatly exceeds that found in most modern texts. In this and in other ways, especially in the provision of careful documentation and an extensive bibliography, Barthelmess's treatment departs widely from the norm of most American textbooks. It should be consulted by teachers and textbook writers, especially by those looking for good illustrations.

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Tables for Integration

For practical computation involving approximate integration on a digital computer, the Gaussian quadrature gives more accuracy than Simpson's rule for the same number of ordinates, at the expense of a complete lack of choice of locating the points. When the integrand is given by a formula sufficiently simple for its value to be calculated from this formula for each value of ordinates, the need for interpolation does not arise, and in such a case use of a Gaussian quadrature formula may be a practicable and useful process. Use of a Gaussian integration formula may also be very valuable in simplifying problems in more than one variable. It can be used, for example, to simplify integro-differential equations involving integrals of the type

$$\int_0^\pi f(r, \theta) \sin \theta \, d\theta$$

The purpose of **Gaussian Quadrature**