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**

Formulas (Prentice-Hall, Englewood Cliffs, N.J., 1966. 384 pp., illus. $14.95), by A. H. Stroud and Don Secrest, is to give persons who engage in approximate integration on a digital computer extensive and indispensable tables of quadrature formulas. The general properties of Gaussian quadrature formulas are introduced in the first chapter. Gauss-Jacobi, Gauss-Laguerre, and Hermite formulas are presented in the second chapter. Fortran programs for computing general Gauss-Jacobi and Gauss-Laguerre formulas are also given. A very good discussion of the various uses of the tabulated formulas (for example, for the construction of product formulas for multiple integrals) and their error bound in various applications follows. For most of the formulas, tables of error coefficients, which enable the reader to compare Gaussian formulas with simpler formulas such as the trapezoidal rule, are also included. The fifth chapter contains a complete survey of other existing tables, and the sixth gives tables of orthogonal polynomials. On the whole, the presentation is clear and careful throughout. The information is up-to-date and complete. Researchers will find the book a convenient and useful reference.

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Medical-Care Legislation in Britain

In **Doctors and the State: The British Medical Profession and Government Action in Public Health, 1870–1912** (Johns Hopkins Press, Baltimore, 1965. 323 pp., illus. $7.95) Jeanne L. Brand presents a well-documented and scholarly study of an awakening of social conscience in England. Although the House of Commons passed old-age and sickness insurance bills for the "labouring poor" in 1773 and in 1789, the bills were vetoed by the House of Lords. The slow development that preceded passage of the first national health act in 1911 exhibited much of the unenlightenment and selfishness that so frequently resist attempts to improve public health and welfare. The ignorance and bigotry of lay bureaucrats suppressed expert medical advice, medical health officers were unwilling to enforce sanitation measures, and individualism conflicted with central authority. There was opposition by fanatics (George Bernard Shaw against vaccination), and the principle of "deterrence," according to which every pauper was a malingerer, was accepted by many. A suggested rehabilitation of unfit homes was denounced as communism; and "too much help destroys habits of thrift and industry."

In spite of all these obstacles, there was slow but steady progress in sanitation and elimination of unhealthy housing and pollution of streams and air. Sanitary sewage disposal and the introduction of safe drinking-water came about after painful delays. Vital statistics, including compulsory reporting of infectious diseases and deaths, were finally introduced. The forces that did most to promote these advances were tragic epidemics of cholera and smallpox, the efforts of courageous members of the medical profession, and the first real recognition that diseases caused by bacteria were preventable. Medicine was usually far ahead of public opinion. Effective legislation came even more slowly. *The Lancet* in 1871 predicted bitterly, "The future historian will record with wonder that the men of the Victorian age would meet and write, and agitate, and petition in order to save one murderer from the gallows, while at the same time they suffered honest citizens to die like rotten sheep rather than pass a law to prevent the dealers in drinking-water to adulterate it with sewage."

Concurrent with these advances in public health and sanitation was the growth of concern with individual health and with the role of curative as well as preventive medicine. The medical care of the destitute was run as part of the poor-law system, with incredible disregard for human values. This was in large part due to bureaucritic lay control. Requests of physicians for extra nutrition for very sick patients were refused, medical officers were poorly paid, and scientific progress was ignored: for example, it was not until 35 years after the introduction of anesthesia that its use was permitted in the poor-law system. There was over these decades an increasing use of the insurance principle for covering the cost of illness by clubs and the so-called friendly societies, but the quality of medical care provided by these societies, as in the workhouses, was poor to scandalous.

In 1899, the British Medical Association rejected a "state department of curative medicine" as being "unnecessary and undesirable," although that association was active in pushing general public-health measures. However, the scientific advances in medicine made the possibility of cure more and more likely, and the increasing influence of the working classes created demands for medical care, backed now by the political power of the Labour Party. There was growing dislike of restricting medical relief to the technically destitute.

A Royal Commission on the Poor Laws and the Relief of Distress was appointed in 1905. Although medical repesentation was considered inadequate by the British Medical Association, a relatively thorough study was made and majority and minority reports were offered. The defects in the medical service provided under the poor laws were admitted by all, but the majority urged that medical assistance not be made "so attractive that it may become a species of honourable and gratuitous self-indulgence." The minority report, though it warned against tempting citizens to range themselves among the destitute, "yet recognized a corporate duty for treatment of those that needed it"; "social health is a joint responsibility of the individual and the community."

The National Insurance Bill was presented to Parliament in May 1911 by Lloyd George. It was a relatively far-reaching scheme with the novel aspect that participation was compulsory. There was practically no consultation with the medical profession in its construction. The British Medical Association made many demands for revision, largely on matters of control and financial return, and spent £53,000 on its campaign against the bill. But the response of the British Medical Association did not compare with the bitterness and distortions that have characterized the American Medical Association's fight against government health acts in the United States.

One realizes with surprise how inadequate this first National Insurance Act was. It covered essentially the adult male wage-earner for short-term risks, with no provision for major surgery, x-ray, or general hospital services. There were some sickness insur-