havior; but several authors, including Paul Halmos (whose book *Towards a Measure of Man* is the only conspicuous omission from this well-documented work) have argued that there are certain physiologically determined forms of mental disorder which are recognized as abnormal in every society. On the whole, sociologists, like clinicians, have found deviance easier to define and study than normality. Coser has justified this by arguing that deviance helps to make explicit and indeed to reaffirm the positive values of the society in which it occurs.

In the biosciences, an earlier preoccupation with clear-cut, identical norms has given place to an appreciation of the range of individual variations. This is perhaps most vividly shown in modern genetic theory, particularly in biochemical genetics, which shows how insistently differences in small details (for instance, in the inheritance of different minor enzyme systems) preserve diversity in a seemingly uniform gene pool. This has led to the acceptance, in most biological fields of study, of the concept of a range of normal findings, with a high statistical probability that a given individual will exceed the range in some of his attributes.

Having reviewed the whole field, the authors summarize the numerous definitions of mental health under the headings Normality as Health, Normality as Utopia, Normality as Average, and Normality as Process. Although they avoid committing themselves, there is an implied endorsement of the last point of view.

In a rather cursory excursion into ancient philosophy, attention is drawn to Plato's exalted view of the role of the philosopher in human affairs. The rhetorical question is put, "Must it logically follow that the present-day psychiatrist, who has been trained in the 'ordering of the mind,' and the psychoanalyst, who has undergone personal analysis, should consider it their moral duty to direct the mental health of the populace?" The authors neither endorse nor categorically reject this alarming proposition, although they eventually state that most of their colleagues would repudiate such a role.

The monograph concludes with the following engimatic sentences: "We have not offered a 'substantive' definition of normality. We believe that the process of definition is currently the responsibility of the individual investigator who, understanding the array of possible definitions, can employ knowledge rather than arbitrary ignorance to formulate his own definition."

On a purely pragmatic level, this book will be of value to all practicing psychiatrists by compelling them to think about their own concepts of normality, which are usually held in a vague, if not self-contradictory form; it is particularly valuable, at a time when psychiatry is reaching out to many underprivileged groups, to be reminded how easily one's own judgments of normality can be colored by the values currently prevailing in the particular section of society to which most psychiatrists belong.

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Plants Used by Man

Franz Schwanitz's **The Origin of Cultivated Plants** (Gerd von Wahlert, Transl. Harvard University Press, Cambridge, Mass., 1966. 183 pp., illus. $4.75) is at least the second book to appear with this title. The first was written by Alphonse DeCandolle and appeared in 1886. DeCandolle's efforts were directed toward description of as many cultivated species as possible and toward determining the place (or places) from which these species arose. Schwanitz, following more in the tradition of Darwin's efforts, attempts to discover how plants (mostly food plants) differ in their genetic and other mechanisms from wild ones and how these mechanisms arose. His book owes a debt to the groundwork laid by Darwin, DeCandolle, and the Russian plant breeder and geneticist Vavilov, all generously acknowledged by Schwanitz.

The characteristic of cultivated plants which is primarily responsible for their usefulness to man is gigantism—witness the enlarged roots of cultivated carrots contrasted to the small, woody taproot of its wild relative (Queen Anne's lace), or the large, fleshy fruits of tomatoes (*Lycopersicon esculentum*) contrasted to the small, seed-filled fruit of the putative wild relative (*L. pimpinellifolium*). Gigantism of certain organs, a phenomenon common to many cultivated species, is caused by several different genetic mechanisms: mutation in some, hybridization in some, and polyploidy in others. Gigantism may result from increased cell size or from increased numbers of cells in the useful part. These variations, once established, are kept going by man—they seldom have any competitive ability if not nurtured, weeded, and watered. And the influence of environment (which must include man as a factor) is another critical part of the picture for the development of cultivated species.

Perhaps primitive man's biggest role in the development of useful plants was in environmental modification. Certainly he did not have a program of breeding toward a desired goal. But by chopping down competitors, keeping livestock, and by generally messing up the natural habitats, he made great strides in the development of most of our cultivated species. Schwanitz does not put it this way. To him, plant breeding is as old as agriculture. His definition of plant breeding is much broader than I would care to make it, since to me breeding involves much more knowledge of the biology of the organisms than the primitive people had. What he must mean is a sort of selection process, in which results of chance hybridization or desirable spontaneous mutation were kept going by some observant primitive farmer.

Whatever interpretation is made, however, this is an informative and useful book. A short list of general references, mostly from the German literature, is appended.

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Variety, Conflict, and Change

Animal Conflict and Adaptation (Dufour, Philadelphia, 1965. 172 pp., illus. $8.95), by J. L. Cloudsley-Thompson, in all honesty should not have been published—certainly not until a great deal more care and time had been put into its composition.

The book contains good summaries of the gross physiological and behavioral mechanisms of adaptation to various physical environments (ocean, land, desert, snow and ice); to other species (predators, prey, parasites, agents of disease); and to other members of the same species (cannibalism, territoriality, hierarchical relations, displacement activity, and so on), and these may 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**