Book Reviews

Principles of Animal Taxonomy. George Gaylord Simpson. Columbia University Press, New York, 1961. xii + 247 pp. $6.

The deepest foundations of taxonomy and classification are examined in this book based upon the Jesup Lectures given in 1960 at Columbia University. The illustrative data are selected from zoology, particularly mammalian zoology, but the principles also apply to botany and microbiology. Taxonomy is considered to be the theoretical study of classification, including its bases, principles, procedures, and rules, while systematics is viewed as the scientific study of the kinds and diversity of organisms and of any and all relations among them. Simpson stresses the reality of the relations of individuals in populations and the relations of populations constituting taxons.

The author emphasizes the interdependence of taxonomy and evolution and refutes the attitude that taxonomy is self-sufficient and sharply distinct from other biological sciences. The whole organism including all of its parts and aspects, its physiology, embryology, behavior, ecology, and biogeography must be taken into account by the taxonomist.

All types of characters do not have equivalent value for taxonomic or phylogenetic interpretation, and various criteria for the comparison of characters are discussed. Simpson quite correctly states that evolutionary classification involves both neontology and paleontology, and he shows the values of each separately and together. Vertical evolutionary time and horizontal relationships, both in the past and present, are integrated.

Although he might have made a better case for the best nomenclatural system to be found in any of the biological sciences, Simpson properly does not exaggerate the importance of nomenclature in taxonomy. The monotypic higher category is justified on sound grounds of relationships and logic. He discusses many theoretical points that can serve as useful deductive guides in making taxonomic decisions. He has not written an *apologia* in order to build up a defense against the shortsighted and sometimes stupid attacks from narrow specialists in other disciplines. He emphasizes the value of other sciences to taxonomy more than the value taxonomy may have for a multidisciplinary approach to the life sciences. However, I feel sure that he is keenly aware of the role of taxonomic research and interpretation in the advancement of other biological sciences. This book is definitely a contribution to the philosophy of science rather than a handbook for the taxonomic specialist.

Controversial Questions: Alternative Views

There is far more to praise than to criticize in this volume, but it behooves a reviewer to raise some controversial questions and to present some alternative views for consideration.

I agree with Simpson that taxonomy has eminent esthetic value. It is devoted to ordering complex objective data, and harmonious order lies at the root of esthetic appreciation. However, in my opinion, Simpson exaggerates the art of the taxonomist. The taxonomist, along with all other scientists, has to use tentative working hypotheses when the evidence is insufficient for clean-cut interpretation. A working hypothesis, even though ultimately shown to be incorrect, should not be assigned to arbitrariness, subjective bias, or artistry, with the implication that it is divorced from facts and scientific logic. Simpson says that the concept of a taxon is invariably subjective. It would be better to call a taxon an abstraction founded upon objective sensory experience. As in other sciences, imagination is necessary in taxonomy and complete information is never attained. Epistomological method and theory apply equally to all sciences.

Simpson examines the concept of the species with much critical penetration and includes the evolutionary time dimension of the entity. However, in my opinion, he could have incorporated the various attributes of the species within a much more adequate operational definition than that of Ernst Mayr's, which he chose to discuss.

His inquiry into the designation of type specimens is, to my mind, inadequate in both theory and practice. The modern taxonomist does not have to adhere to the typological concepts of an earlier age. Greater accuracy of nomenclature, of identification, and of handling growing knowledge can be attained by the designation of type specimens that include several categories of secondary types, which is a practice Simpson finds unnecessary, confusing, or ridiculous.

Although I do not disagree with his definition of homology as "resemblance due to inheritance from a common ancestry," he might have emphasized the genetic component more. In the past Simpson has contributed immensely to a synthesis between genetics and paleontology. In this book he does not think it practical or theoretically desirable to base homology on identity of gene components. He says: "If a given characteristic is continuously present in an ancestor and in all the descendents of a given lineage, then it is homologous throughout even though the genetic substrate has changed." "Genetic evolution and somatic evolution are not identical or precisely parallel and . . . it is somatic evolution that is more directly pertinent in taxonomy." As an alternative theory, I would say that evolution is essentially change of some genetic components together with stability of other genetic components, all selected through their phenotypic functions. Part of the controversy arises from Simpson's definition of parallelism. He has not sufficiently considered vestigial characters undergoing parallel regression. Other terms applied to various forms of similarity such as homoplasy, convergence, analogy, and chance seem to me to be adequate. I also agree with his use of interpretive rather than straight descriptive terms.

Simpson defines monophyly as "the derivation of a taxon through one or more lineages from one immediately ancestral taxon of the same or lower rank." To my mind, this definition allows for the inclusion of independently evolved grades of organization or adaptation which are not homologous in the strict (or genetic) sense. For example, he includes the monotremes with the marsupials and placentals under the class Mammalia, although he considers

the common ancestor to be a therapsid reptile and not a mammal. He also includes the superfamilies Ceboidea, Cercopithecoidea, and Hominoidea in the suborder Anthropoidea, although he recognizes the independent origin of the Old World and New World monkeys from a prosimian base. The taxons Mammalia and Anthropoidea as used by Simpson seem to rest upon analogies and diphyletic origins and therefore to be in need of taxonomic revision at the higher category level.

If these differences of opinion were merely arbitrary and concerned the classification and naming of a few groups of animals of interest to a small number of specialists, the matter would not be of great import, but basic principles of biology are involved. Sufficient evidence is available to indicate that more strict definitions of homology, and parallel evolution would provide better correlations of taxonomic and evolutionary order.

Scholarly Approach to Taxonomy

In spite of these criticisms, it is my sincere opinion that this book marks an important advance in taxonomic theory. The result of mature experience in the taxonomy of both fossil and living mammals, it represents a fine scholarly approach to a science that is essential to all comparative biology. Even its ambiguities and inadequacies will set the stage for more critical tests of important hypotheses and interpretations in the near future. All biology will progress as the result of the balanced integration of modern taxonomy within the life sciences.

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Handbook of Abnormal Psychology. An experimental approach. H. J. Eysenck, Ed. Pitman, London; Basic Books, New York, 1961. xvi + 816 pp. Illus. $18.

In this book we have clear indications of how a new, vital discipline has finally evolved into a distinct species and of how it is beginning to find its own place among disciplines of similar genre. As in the case of all historical emergents, it is bound to influence related disciplines in some degree, giving advantage to some and perhaps hastening the modification or disappearance of others as it struggles to survive and grow.

The chapters have their roots in and represent a special focus of experimental psychology. Abnormality is defined not in terms of people suffering from mental disease produced by "definite" causes, but in terms of the defective functioning of various psychological systems. The psychiatric framework is rejected outright. Chapter headings found in textbooks of recent vintage—such as "The neuroses," "Amnesia," "Disordered emotion," "Disorders of volition," and the like—have given way to chapters entitled "Somatic reactivity," "Conditioning," "Learning and abnormal behavior," "Abnormal animal behavior," and "Applied abnormal psychology: the experimental approach." Throughout the book, there is a deliberate effort to avoid the concepts, nosology, and clinical observations of both descriptive and dynamic psychiatry and also, to some extent, the literature on multifactorial tests such as the Rorschach, Thermatic Apperception Test, and even the Wechsler intelligence scales. Instead there is a common effort to base all topical reviews on laboratory findings and sound statistical analysis.

The reader, however, should not expect to find many signs of maturity in this young field, apart from some methodological and orientational ones. There is still no body of accepted theory which can come close to unifying the wide, varied literature reviewed.

The theories which are found are primarily those of Hull, Pavlov, and Eysenck. The latter's theoretical formulations are represented out of all proportion to what would be the case if a similar book were compiled in this country, primarily because the authors of the various chapters are mostly his students and colleagues. The treatments of some of the topics are narrower in their outlook than they should be and statements are sometimes offered as fact although they represent still unsettled issues, but the level of the work is uniformly high. Two of the chapters should not have been included at all. The controversial quality of some of the discussions clearly reflects the youth of the subject, but it also indicates the subject's vitality and sense of purpose.

Eysenck asks, "What is a handbook?" And he answers: "A handbook is what a handbook does." What this handbook does is to renounce its psychiatric heritage, to proclaim abnormal psychology as a legitimate offspring of experimental psychology, and to point the direction in which the field must grow. As a single reference and source book of abnormal psychology, it now stands by itself, but before very long we can expect others in this same experimental vein with different emphasis and with more complete development of most of the topical areas.

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Structure and Function of Muscle. vol. 1, *Structure.* 472 pp. $14. vol. 2, *Biochemistry and Physiology.* 593 pp. $16.50. vol. 3, *Pharmacology and Disease.* 489 pp. $15. Geoffrey H. Bourne, Ed. Academic Press, New York, 1960. Illus.

In the not too distant past, the publishing of multivolume handbooks was a specialty of the German scientific world, but it seems that this has now become an American occupation. It is hard to say whether we make them bigger and better, but surely many of them have recently been devoted to various biochemical and other biological subjects, and indeed they form most valuable additions to institutional and departmental libraries.

The work under discussion is not specifically called a "handbook," although it is one because of the breadth of its scope. Its virtues: in three well-executed volumes of not excessive size, it gives a cross section through the field of myology. To various degrees (some special comments follow), the individual chapters are well-rounded and mostly very readable, so that anyone who studies the entire work (which is perfectly possible) will acquire a great deal of knowledge. Its weakness: so much is missing that such an eager reader will still have to supplement his reading to a significant extent if he wishes to be in contact with the major problems, and not all of this additional material is easily accessible. It would have been better, strange to say, if the work had been expanded somewhat to cover some additional topics.

This mild criticism must be substantiated, so let us proceed. There is a lucid over-all review of the biochemistry of muscular action by D. M. Needham and an outstanding chapter on the biochemistry of the sarcosomes by Slater,