Book Reviews

Causal Theory of Evolution

The Origin of Adaptations. Verne Grant. Columbia University Press, New York, 1963. 704 pp. $12.50. *This book, which was originally scheduled for publication in July, was reviewed from galleys. It is now scheduled for publication on 23 September.*

Beginning in 1933 with the publication of Dobzhansky's *Genetics and the Origin of Species*, Columbia University Press initiated a line of distinguished books dealing with one aspect or another of organic evolution. Indeed, a major portion of the newer contributions to our knowledge of evolution has been recorded and summarized in these books. *The Origin of Adaptations* by Verne Grant, which is scheduled for publication in September, will be a new addition to the series.

The title of Grant's work seems broad enough to cover a large fraction of our present knowledge of evolution, but it indicates neither the extent of the author's interests nor his aim in writing the book. His objective, however, is stated explicitly in the preface:

> The purpose of this book is to set forth the causal theory of evolution as applied to diploid sexual organisms. I have tried to present this theory as a continuous logical argument supported by a sample of the relevant evidence. In a word, I have attempted to provide a general framework in which we can organize our present knowledge concerning the evolutionary process in the higher plants and animals. . . . The following pages will make it difficult to categorize the book as either elementary or advanced. In fact it is both and neither. What it attempts is to be fundamental.

Any work should be judged, of course, on the grounds of the author's intentions—on whether or not he achieved his objective—and also on the importance of the objectives themselves. I am convinced that in this instance the author was successful; he has made a worthy contribution to an important subject. *The Origin of Adaptations* is a valuable book.

Grant begins with a brief history of the origin and development of the concept of organic evolution, continues with a short account of our present ideas about the origin of life, and then traces the later course of evolution in some detail. He discusses, first, the organic compounds that we believe were able to duplicate themselves on a primitive and, at the time, sterile planet. He then proceeds to describe the growing complexity of the cellular forms that represent the first living organisms. His account continues until he reaches the production of the manifold species that exist today. He emphasizes the causes of evolution, especially the operation of the physical environment in selecting and preserving some forms and in destroying others, thus separating the fit from the unfit. The fit individuals have sometimes been defined merely as those who survive, a definition that reduces the famous phrase "the survival of the fittest" to a mere tautology. The "fit," the author demonstrates, are those individuals who are better adapted to their surroundings, and Grant describes in somewhat more detail the many different evolutionary paths taken by the successful in becoming adapted. Here he gives an excellent account of the evolution of adaptation itself, an aspect of evolution that has long needed a critical treatment.

In dealing with adaptation, of course, the age-old question arises about the possible inheritance of the adaptations to its way of life that an individual may achieve—our old friend "the inheritance of acquired characters." The voluminous data that the author has assembled show that this ancient explanation of evolution is no longer needed and that it is incompatible with our more recent information.

The classical evolutionists of the 19th century certainly would be astonished by our modern treatment of the topics that concerned them so intimately, such topics as natural selection and the inheritance of Darwinian variations. By bringing these older factors of evolution up-to-date and by adding to them the factors unknown to our predecessors, the author shows what progress has been made in evolution theory during the 20th century. These more recently discovered factors include genic drift, the scattering of variations in small populations, and the overall impact of mutation pressure. The author covers all of these causal factors of evolution in more detail than is found in most modern books on evolution. *The Origin of Adaptations* will be a most useful reference source.

The latter portion of the book deals with speciation, especially with the origin of allopatric and sympatric species, and with the many different types of isolating mechanisms that serve to break up ancestral species into separate breeding groups, and thus to split them ultimately into separate and distinct races and species.

The work is well organized and the writing is clear and unambiguous. At first glance, it seems to include a great many simple truisms, and it does restate numerous facts that biologists have known for a long time. It would seem that many of these could have been omitted without loss. But what to omit and what to include is a problem that has to be left to an author, for there is no simple solution. Any cogent and logical presentation of a subject as complicated as organic evolution must organize both the earlier and the later discoveries and give them to the reader as a logically consistent whole. To omit the facts that are well known, or those that have been known for a long time, would be to leave gaps in the presentation.

The Origin of Adaptations is hardly a work for the laity, or a textbook for beginners. The professional biologist, however, should find it informative and very useful. To anyone teaching a course in evolution, it should be a major aid and convenience. It contains almost no gaucheries and no minor details that call for comment. However, I was startled to find Jean Baptiste Pierre Antoine de Monet, Chevalier de Lamarck, cited as Pierre Lamarck. Incidentally, what did his friends call him?

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