Book Reviews

Adaptation and Origin in the Plant World: The Role of Environment in Evolution. Frederic E. Clements, Emmett V. Martin, and Frances L. Long. Waltham, Mass.: Chronica Botanica; New York: Stechert-Hafner, 1950. 332 pp. $6.00.

The senior author of this publication, the late F. E. Clements, is well known for his writings in the field of plant ecology. He has been one of the pioneers in this branch of botany in the United States and his publications, along with those of another pioneer, the late H. C. Cowles, have done much to formulate and clarify our ideas of plant succession. The textbook, *Plant Ecology*, with which Clements shared authorship with J. E. Weaver, was for many years the standard text for introductory courses in this subject.

Dr. Clements was a field botanist. Observing plants in the field under varying external conditions, he was perhaps unduly impressed by the role of environment in molding organisms and finally came to believe that new forms could arise by the action of environmental factors alone. The present volume represents the results of controlled experiments conducted in the field, over a period of some 40 years, which were intended to determine the role of environment in evolution. The preface, by Edith S. Clements, states that the results of these studies, conducted by Dr. Clements and his co-workers, were originally planned to be published in a series of four booklets. The first book in this series (E. V. Martin and F. E. Clements), was published in 1939. The second booklet is an account of adaptation under control in many garden habitats at Santa Barbara, including the Dune Gardens. The third volume was to have dealt with response to climatic and edaphic conditions in numerous natural gardens of the transplant transect on Pikes Peak. The fourth and final book of the series was intended to be a detailed analysis and discussion of the convergence and conversion of species at both centers and of the ecological basis of evolution. The original plan was somewhat modified after Dr. Clements' retirement, when it was decided to combine booklets II and III into one volume. This manuscript was practically completed before the death of both Dr. Clements and Dr. Long in 1945. The present volume consists of most of that material, in addition to some of the information originally intended for book IV.

The publication is copiously illustrated by excellent photographs and there are numerous tables and graphs. With the current interest in experimental taxonomy, many will find these data of particular interest, although the authors' interpretations may be open to question.

It has long been known that organisms show different responses to varying environmental conditions. The authors of this volume conclude that adaptation is brought about by responses to direct physical factors and is expressed both in function and in form. They further state that for all the species employed, there is no evidence that it arises through the selection of genetic strains or variations. They believe that it is possible to convert one Linnaean species into another by altering the environment. Further, that while "the conversion of one genus into another, morphologically at least, is much more difficult than with species, it is far from impossible." One might wonder whether these supposed species and genera are able to hybridize, and the answer is provided in the publication. Crossing was employed in a number of species, chiefly with reference to its *supposed* value in distinguishing between species and forms of lesser rank. The result was that "crosses between groups with the character of Linnaean species have failed in all cases tried." It seems incredible that environment is able to convert one species into another when these plants are so unrelated that they are unable to exchange genes. If species A and B are not able to hybridize and through environmental changes A is converted to B, we should expect that a cross between the new A and B would be successful. This reviewer has failed to find in the publication any evidence that such an experiment was attempted. A rather strange statement is that "Perhaps hydridization is to be regarded primarily as a nutritional (chemical) rather than a genetic disturbance directly."

In contrast to these conclusions are those of Clausen, Keck, and Heisey (*Carnegie Instn. Wash. Publ.*, 1940, 520), who conducted similar experiments. Dr. Clausen is an able geneticist, and Dr. Keck is a taxonomist of sound reputation. These authors conclude that natural selection determines the character of the plants that occupy a given environment, and that the ability of a plant to accommodate itself to a new environment is dependent upon its genetic constitution. They further state that, in their studies, changes produced by the environment give no evidence of permanence, and although they may be quite spectacular, they never obscure the individuality of the plant.

The present volume is no exception to other publications by Dr. Clements in regard to specialized terminology. Fortunately, there is a glossary, without which many might have found difficulty in following the discussions.

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Phenomena, Atoms and Molecules. Irving Langmuir. New York: Philosophical Library, 1950. 436 pp. $10.00.

This collection of papers by Irving Langmuir might well be dedicated to the spirit of W. R. Whitney, who to such a large extent was responsible for the development of basic research in an industrial laboratory.

Of the 18 papers, three deal with general principles of science, its development, and scientific philosophy. The fourth, "Surface Chemistry," is the lecture given by Langmuir at the time he received the Nobel prize,