Arizona and California. Four specimens were taken at Newcastle, Colorado, on July 16, 1907, by E. R. Warren,[1, 2] the locality being situated on a narrow tongue of Upper Sonoran almost surrounded by Transition but connected by a belt of the Upper Sonoran across Utah with the Lower Sonoran in Arizona, part of the regular habitat of the species.[2] A free-tailed bat, referred to this form, was collected at Manhattan, Kansas, in 1884, by Dr. C. P. Blachly.[3] This latter locality is Carolinean, but is not decidedly distant from the Austroriparian of the Lower Austral zone of southern Kansas and is connected by this with the lower Sonoran fauna in Oklahoma (and possibly in south central Kansas, locally), which latter area is an unbroken northward extension of the Lower Sonoran of Texas where the free-tailed bat is abundant.[4] It seems likely that the Manhattan individual reached Kansas from Texas by this course across Oklahoma and the Lincoln occurrence is probably due to a still more northward extension of the same route, although Lincoln is about two hundred and fifty miles from the boundary of the Lower Austral zone. Possibly the excessive heat and dryness of the past summer in Kansas and southern Nebraska had something to do with the appearance of this bat of the far southwest at a locality so distant from its normal range.

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September 12, 1913

SCIENTIFIC BOOKS

Problems of Life and Reproduction. By Marcus Hartog. G. P. Putnam's Sons. 1913. Pp. 382, 41 text figures.

This volume consists of a series of eleven chapters dealing for the most part with cytological questions relating to the mechanism of heredity, but in part also with general subjects, such as the teaching of nature study. It is, indeed, a collection of biological and philosophical essays published during the period from 1892 to 1910 and here reworked and modernized, to a degree, by interpolation or rewriting. There is lacking any sustained theme except such as is furnished by the consideration of vital processes in some form.

The work was first conceived as a general treatise on reproduction for the non-scientific public, but in its present form, although a reprint of articles already published, is evidently again addressed largely to scientists. If this were not so it would be little read, for there is no lack of technical expressions and the author rarely resists the temptation to increase the number of these by the transformation of common terms into Latin forms.

The attitude of the author is controversial and he announces in the preface that he has "not hesitated to use all the legitimate arms of scientific controversy in assailing certain views." He inveighs strongly against the practise of those writers who present the opinions of any one school as the verdict of biologists in general, but is himself not entirely guiltless of such emphasis on his own conclusions. There appear frequent claims for priority of observation—and especially of theories, not a few of which are the common property of all who generalize. There is apparent the customary European lack of information concerning biological America, the result of which in this case has led the author to explain the processes of fertilization as one bringing about "rejuvenescence." As proof of this he advances the questionable work of Maupas upon the Protozoa in apparent ignorance of the convincing work of Jennings to the contrary. Since some of the essays were written a decade or two ago, there is sometimes lacking a modern viewpoint in the discussion, and even modern evidence is sometimes wanting. The search for ultimate explanations also leads to the assignment of names to conditions or relations which are then regarded as having been explained. Aside

[1] E. R. Warren, "Further Notes on the Mammals of Colorado," p. 85, 1908.

[2] Merritt Cary, "A Biological Survey of Colorado," N. A. Fauna, No. 33, pp. 204–205, 1911.

[3] D. E. Lantz, "Additions and Corrections to the List of Kansas Mammals," *Trans. Kansas Acad. Sci.*, XX., Part II., p. 216, 1907.

[4] Vernon Bailey, "Biological Survey of Texas," N. A. Fauna, No. 25, pp. 215–216, 1905.

from these lapses the author shows strength, vigor and clearness in his method, and however much one may differ from him regarding facts or theories there can be no denial of the individuality or consistency of his views.

Among the diversity of subjects considered certain themes stand out because of emphasis and repetition. Briefly these may be stated as follows: Sexual reproduction is a process for securing rejuvenescence; fertilization effects a cellular reorganization by bringing nuclear material into new cytoplasmic surroundings; reduction is a process to check the indefinite multiplication of chromosomes whose important constituent, the linin, is mechanically divided by the splitting of the chromatin granules; cell division is due to a "new force, mitokinetism," confined to living matter; heredity is not to be explained through the action of any germ plasm, but "can only be elucidated by the light of mental, not material processes"; acquired characters are inherited; such collateral inheritance receives an explanation through the operation of "unconscious memory" according to the theories of Hering and Butler; chemical and physical laws are not sufficient to account for the activities of organisms and we must assume a "vital behavior."

From all of which it is easily seen that Professor Hartog may be classed, philosophically, as a vitalistic Lamarckian. While he strikes vigorous blows in defense of his faith, it must be admitted that he brings little that is new or convincing in proof. It seems impossible not to believe that the reproductive elements are in some way and to some degree affected by conditions external to them, but it brings slight comfort and mental satisfaction to have offered as proof of such a fundamentally important principle the case of two normal children who are supposed to inherit a peculiar habit of writing because a myopic-astigmatic father has developed this as a result of his defective sight. Although the children fail to inherit the structural defect, and the father under corrected vision spontaneously loses the habit at the age of fifteen, they are reported to have it so firmly engrafted upon them as to make its eradication almost impossible. While the writer considers Lankester's logical presumption against the sudden fixation of slight influences through the soma upon the germ cells—in the face of a long adverse phylogenetic history, he does not make a satisfactory answer to it. Much more probable seems the gradual, cumulative effect of a persistent, long-continued influence upon successive generations which finally is able to overbalance the weight of the racial inertia. This would seem to account for the universal failure of experimental proof in support of the theory of inheritance of acquired characters—a theory which seems to be logically correct and which makes such a strong appeal to those who study extensive racial histories.

More scientific is the author's treatment of the problems of maturation and fertilization, although to many there will occur objections that weigh strongly against some of his conclusions. Why so general and apparently important a process as the reduction division should have become established merely to prevent indefinite multiplication of the chromosomes does not receive adequate explanation. Likewise there is no convincing evidence for the conclusion that the linin is the important part of the nuclear substance, for which the chromatin plays merely the mechanical rôle of a dividing agent. Surely Professor Hartog can not have made a careful study of the nucleus during the long and significant growth period preceding the first maturation division or he would not say (p. 138) "whatever be the function of the chromatin in the '*working*' cell, as we may term it, it is evidently less important than its function in the *dividing* cell."

The striking character of the fully established mitotic figure evidently makes a strong appeal to the author, for besides the conclusion just quoted he is led, from the conditions of the bipolar figure, to postulate an entirely new force, mitokinetism, to account for cell division. The whole argument for the new force is based upon the bipolar spindle, yet nothing is more evident than the fact that this

is but the culmination of a long series of changes which have been taking place both within and without the nucleus. All of these changes are ascribed by Professor Hartog to the operation of other physical and vital forces which are finally succeeded by the "new force" which comes into operation upon the establishment of the spindle-shaped figure. The efforts of many who would explain the process of mitosis through the action of various chemical and physical laws have failed through inadequacy of the explanations to meet all the conditions of the process. It does not seem that the author has been more successful by first proclaiming an absolute divorce between nuclear division and cell division and then invoking a new force to complete the broken contract.

For those who enjoy philosophical debate and formal explanations there will be much of interest in Professor Hartog's discussion of vitalism and of heredity through the operation of universal and unconscious memory. Very readable is his appreciation of the work of Samuel Butler. The teacher will find sound argument for natural as opposed to strictly logical methods of teaching in the chapter on "Interpolation in Memory." In the final chapter on "The Teaching of Nature Study" there is much sound pedagogical wisdom and moral support for those who would have such work taught in a way to make it worth the while of the student.

C. E. McClung

Modern Research in Organic Chemistry. By F. G. Pope, B.Sc. (Lond.), F.C.S., Lecturer on Organic Chemistry, East London College. New York, D. Van Nostrand Company. 1913. $5\frac{1}{2} \times 7\frac{1}{2}$, Cloth. Pp. xi + 324. With 261 diagrams. Price $2.25 net.

This book is an attempt to bring before the student of chemistry a brief account of the development of some of the more important chapters of organic chemistry. It is the American reprint of the English book with the same title published by Methuen and Co. in London in 1912. It contains an introduction by Professor J. T. Hewitt and nine chapters which have no connection with each other. These chapters are: I., The Polymethylenes; II., The Terpenes and Camphors; III., The Uric Acid or Purine Group; IV., The Alkaloids; V., The Relation between the Color and Constitution of Chemical Compounds; VI., Salt Formation, Pseudo-acids and Bases; VII., The Pyrones; VIII., Ketenes, Ozonides, Triphenylmethyl; IX., The Grignard Reaction.

In each chapter methods of preparation, for the most part synthetical, are given and the reactions of some of the best known representatives of the different classes of compounds are discussed, especially those which are used to determine the structural formulas of the compounds. Throughout the book structural formulas are used almost exclusively. At the end of each chapter there is a bibliography containing a list of the more important papers on the subject matter of the text, so that the student may consult the original articles if he desires to do so. The book is very difficult reading, but for those to whom the original papers are not available and who wish a brief résumé of the researches on which the structure of these compounds is based, it will probably prove useful.

In a book with such a title we should naturally expect something to be said of the researches on the carbohydrates, on the synthesis of indigo and of india-rubber, but no mention is made of these very important chapters of organic chemistry.

W. R. Orndorff

SCIENTIFIC JOURNALS AND ARTICLES

The October number (Vol. 14, No. 4) of the *Transactions of the American Mathematical Society* contains the following papers:

Maxime Bôcher: "Applications and generalizations of the conception of adjoint systems."

E. J. Wilczynski: "On a certain class of self-projective surfaces."

G. A. Miller: "On the representation groups of given abstract groups."

Dunham Jackson: "On the accuracy of trigonometric interpolation."

G. D. Birkhoff: "On a simple type of irregular singular point."

John McDonnell: "On quadratic residues."