suddenly but gradually. It certainly seems as logical that both adaptations and adaptive agencies should show continuity as that organisms should; and we should be able to trace adaptations back, precisely as we trace organisms, through simpler and simpler conditions until we reach the ultimate origin of them all in the simple undifferentiated protoplasm of the original organisms.

Principle 5. Inevitable Imperfection of all Adaptation.—It appears to be true that no feature of any organism is free to respond unhampered to the influence of an agency producing adaptation. Inevitable impediments to such complete responses arise from several sources—from various hereditary influences, from physical and chemical limitations of their powers, from the necessity of providing for nutrition, support and protection, from the presence of other adaptations, and from the presence also, it is possible, of other features highly developed without reference to any utility. The result of the operation of all of these influences upon any feature is a state of equilibrium, of which adaptation is a part, no doubt usually as large a part as the other conditions will permit, but frequently only a minor part. In every case, therefore, adaptation must fall below its perfect development, or must be imperfect. Of no feature can it be true that it is all adaptation, but it must be adaptation plus other considerations, and the latter in any structure may collectively even outweigh the former. Now it is without doubt the task of the ecologist not only to determine adaptation, but as well to delimit the other influences which interoperate with it to make structures what they are. In other words, it is the task of the ecologist to determine the meaning of the features of the plant whether that meaning involves adaptation or not.

Such seems to me the nature of adaptation as indicated by the evidence we possess. Certainly it is true that ecology is but in its beginning.

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SCIENTIFIC BOOKS.

Palmer's 'Index Generum Mammalium.'*

Dr. Palmer's 'Index Generum Mammalium' is a work of immense labor, painstakingly and intelligently performed, and its publication will form a landmark in the history of mammalian nomenclature. It furnishes not only an elaborately annotated list of all the generic and family names of mammals, recent and extinct, published since the beginning of the binomial system of Linnæus down to the end of the year 1903, but the introduction, besides disclosing the origin, history and scope of the work, furnishes a fund of historic information that should most favorably influence the methods of the future in the bestowal and use of names by systematists, not only in mammalogy but in other departments of natural history.

The work consists of an 'introduction' of about 70 pages, followed by Parts I.–III., with an appendix, and an index to Part III. Part I. comprises 'Index of Genera and Subgenera' (pp. 71–717); Part II., includes the 'Family and Subfamily Names of Mammals' (pp. 719–776); while Part III. is an 'Index of Genera Arranged According to Orders and Families' (pp. 777–948). The appendix contains names discovered too late to insert in their proper places in Part I. and various additions and corrections, by means of which 'the index is brought down to January 1, 1904.'

In the 'introduction' (pp. 8–69) there is first a statement of the history and purpose of the work. From this it appears that the work was begun by Dr. C. Hart Merriam about

* 'Index Generum Mammalium: A List of the Genera and Families of Mammals.' By T. S. Palmer, Assistant, Biological Survey. Prepared under the direction of Dr. C. Hart Merriam, Chief of Division of Biological Survey. North America Fauna No. 23, U. S. Department of Agriculture, Division of Biological Survey. Washington, Government Printing Office, 1904. (January 23, 1904.) 8vo, pp. 984.

1884, and was taken in hand by Dr. Palmer in 1889, who continued it, aided by competent assistants, till its completion in 1903, it being carried on in connection with the systematic work on mammals conducted by the Biological Survey. Under 'acknowledgments' special mention is made of the careful and painstaking work of Miss Thora Steineger, who spent much time in several of the leading libraries of Europe in verifying references, besides rendering important clerical assistance in Washington throughout the progress of the work. Especial thanks, on behalf of the users of the index as well as the author, are also rendered to Mr. F. H. Waterhouse, librarian of the Zoological Society of London, who, on learning of Dr. Palmer's work, generously placed in his hands a large amount of manuscript he had already prepared for a similar undertaking.

The introduction treats in much detail all the principal questions, moot and otherwise, that relate to nomenclatural usage. Under 'References and Dates' is considered the important question of what constitutes publication, and the necessity of determining, and respecting, actual dates of publication, which are often difficult to ascertain. In this connection is presented a useful list of special papers giving dates of publication for works issued in parts, and dates of the parts of the 'Proceedings' of a number of scientific societies and museums. Under 'Authorities and Localities,' and 'Types and their Determination,' are treated important questions of usage about which authorities often differ, as the determination of types of genera, etc., apropos of the author's methods in the present work. A list of 'Hypothetical Genera' is accompanied by pertinent comment; 'Changes in Form of Names' covers a consideration of the much-vexed question of the proper treatment of 'emended' names. On this point the author says: "Probably no section of the A. O. U. Code has been the subject of so much criticism as Canon XL., which provides that 'the original orthography of a name is to be rigidly preserved, unless a typographical error is evident.' Stability and priority are two of the cardinal principles of the code, but priority is merely a means of securing stability, and applies as well to the adoption of the earliest name as to the earliest form of that name. Experience has shown that any other course leaves the door wide open to emendation and resultant confusion." A number of generic names are cited, having from five to eight variants that have been more or less in use, in illustration of the results of emendation; and in further elucidation of the extent to which emendation may be carried, it is shown that the name *Aplodontia*, with eight actual variants, 'is capable of at least twenty-four modifications, each one differing from the rest by a single letter.' Some eminent zoologists maintain that a difference of a single letter in two names is sufficient to distinguish them, and to prevent the later name or names (for there are often several) from being thrown out as preoccupied, whether the difference in form is due to gender, to a difference in the connecting vowel in compound words, or to the presence or absence of aspirates; while others consider names the same when having the same etymological origin, though differing in form.

Under 'Rejection of Names' the author considers at length the following topics: 'Preoccupied names,' under which is given a most useful 'List of Homonyms within the Class Mammalia; and another list of preoccupied names in mammalogy and ornithology; 'nomina nuda,' French common names of Latin derivation, 'plural subgeneric names,' etc.

Pages 41–46 are devoted to the 'Etymology of Names,' under which are considered classical names, barbarous names, 'nonsense names' ('coined' names and anagrams), mythological names, geographical names, personal names, compounds and double generic names. These pages contain an immense amount of information, both historic and etymological, in reference to the sources and relative prevalence of these different classes of names, illustrated by tabular expositions, which are not only of high interest but of much practical utility, but which it is impossible here to particularize. The section devoted to 'Application of Names' (pp. 60–

67) also abounds in interesting and practical information.

In Part I., 'Index of Genera and Subgenera,' the names stand in alphabetic sequence, and under each are given from half a dozen to a dozen distinct and important items of information, as follows: Author and date; the order and family to which it is referred; the place of its original publication; its variants, if any, and by whom, when and where published; its type if specified, and if no type was given by the author, and none has been since 'fixed,' a list of the species originally included under it; the locality whence, and the place where the type was described, and, if an extinct species, the character of the type specimen, and its geological formation and locality; its etymology and significance, or, in the case of a barbarous name, its original source and use. If the name be antedated or preoccupied, these facts are duly noted; and where the same name has been proposed for different genera of mammals, its several uses are given chronologically. In this way the history and status of each name is fully set forth, so that its availability or non-availability is easily determined. In no other work has such fulness of treatment been given, nor is it easy to see where anything essential to the history of a name has been omitted. As the 'index' includes upward of 4,500 names, the immense amount of labor involved in its preparation is evident, while no similar work is to be compared with it in fulness of detail and consequent usefulness. Of these 4,500 names, it is stated that over 400, or 10 per cent., prove to be preoccupied, and of these latter 'about 150, or nearly 40 per cent., are homonyms in the class Mammalia' (p. 953).

In Part II., 'Family and Subfamily Names,' the treatment is necessarily different, in accordance with the requirements of the case. Here the name, author, date and the order to which it is referred are stated, followed by a reference to the place of first use, with secondary references to its variants, if any, and modified uses as regards the rank of the group. The arrangement is, of course, alphabetic, and the index proper is preceded by several pages giving the history of the origin and use of such names, particularly in reference to the final adoption of the terminations *idæ* and *inæ*, indicating respectively families and subfamilies. There is also a summary of the rules that have been proposed by different nomenclatural codes in relation to these groups, and illustrations of the difficulty of applying these rules.

Part III., 'Index of Genera Arranged According to Orders and Families,' has been prepared to show 'what names have been used in a certain group, why a name is unavailable, or whether any published name is available for one which is preoccupied.' The arrangement is here alphabetic, first as regards orders, and secondly as respects the families, subfamilies and genera, within the orders. The classification adopted is that of Flower and Lydekker in 'Mammals, Living and Extinct' (1891), with modifications; the nomenclature, however, is often different. 'The name of the class Mammalia,' says the author, 'is one of the few names concerning which there is universal agreement.' After illustrating how modern authorities differ in respect to the names of even the primary divisions of the class, the author gives an outline of the classification and nomenclature here adopted, and an explanation of his system of cross references designed to facilitate the finding of any desired name.

This part of the work is especially important, and amounts to, practically, a revision of the nomenclature of the Mammalia, recent and extinct. In respect to family names, the name based on the earliest generic name has been adopted when available, as when the genus on which it is based is not antedated or preoccupied. Under the family name are cited (1) its synonyms and subfamilies, (2) its genera, with the author, date and type species of each. Recent genera are distinguished from extinct genera by the use of black-faced type for the former and italic for the latter; preoccupied names have a dagger (†) prefixed, but names otherwise untenable appear not to be designated, except as shown by the context.

The appendix adds 35 names discovered too late to be included in Part I. These include

a few from Frisch (1775) and a considerable number from Billberg (1828), and others proposed during 1903. These early names are fortunately merely *nomina nuda,* or synonyms, or otherwise untenable. The appendix also includes several pages of corrections, some of them important, affecting the authorities for a few genera given in Part I., and in one case the orthography of a name, *Tayassu* G. Fischer (1814) becoming *Tagassu* Frisch (1775), with a corresponding change in the family name based on this genus.

It can not be supposed that a work of this character can be entirely free of errors, but with the great care taken in the preparation of the manuscript (see p. 11) they are doubtless reduced as nearly to a minimum as can reasonably be expected. The work embodies the results of a vast amount of labor, for which mammalogists can not be too grateful; it has set a high standard for future workers in the same line to emulate; and has placed in the hands of experts in nomenclature an invaluable aid in their work. J. A. A.

Monograph of the Coccidæ of the British Isles. By ROBERT NEWSTEAD. Vol. 2. London, Ray Society, 1903. Pp. 270; 41 plates.

The long-expected second volume of Mr. Newstead's monograph is at last to hand, and we have in the completed work the best treatise on the Coccidæ yet published. The beautiful colored plates, the excellent notes on habits and modes of occurrence and other good features maintain the high standard set in the first volume; and as before, many of the species are as familiar in America as they are in England.

The nomenclature employed is in most cases very different from that of Mrs. Fernald's new catalogue, although the more recent views are discussed in an appendix. Mrs. Fernald's catalogue had not appeared when Mr. Newstead's volume went to press, which is to be regretted, as it contains much bibliographical matter which would have been of service to the author. In the present state of coccidology any writer may well be excused for not accepting all the recently proposed innovations; but it does seem to me that some of them stand on unassailable ground, and should not be resisted by any logically minded person. For example, *Pseudococcus* can not be allowed to stand for species, none of which were placed therein by the describer of the genus.

As regards both genera and species, Mr. Newstead is a 'lumper,' though by no means a reckless one. I have been studying his excellent descriptions and figures, and find that, according to the system represented by Mrs. Fernald's catalogue, the following changes (among others) should be made:

Lecanopsis formicarum, Newst., becomes *Spermococcus formicarum.*

Dactylopius pulverarius, Newst., becomes *Trionymus pulverarius.*

Ripersia terrestris, Newst., becomes *Rhizœcus terrestris.*

Ripersia halophila (Hardy) becomes *Ripersiella halophila.*

Thus four genera are added to the British fauna; the third, however, evidently introduced by man. The indication of these generic relationships, whatever may be thought of the genera, is strongly suggestive of certain specific resemblances. It is not improbable that future careful comparisons will bring to light some synonymy.

If, as Mr. Newstead holds, all the British forms of *Phenacoccus* (he calls them *Pseudococcus*) are of one species, the conclusion seems almost irresistible that *Phenacoccus pruni* (*Coccus pruni,* Burm., 1849) is its proper name. According to Mr. Newstead's figures, the second antennal joint, while usually considerably longer than the third, varies to about equal with it. Among our American species, these joints also vary, but we have recognized what appear to be three different types, not normally intergrading:

1. Second and third joints nearly equal. *P. dearnessi, rubivorus, minimus, spiniferus, acericola.*

2. Second conspicuously longer than third. *P. solenopsis, helianthi, wilmattæ, artemisiæ, cevalliæ.*

3. Third conspicuously longer than second. *P. osborni, simplex, stachyos.*

These species of course have other peculiarities, but I certainly have believed that the

antennal characters (allowing a good deal of variation) were specific. Of course, it is quite possible that the English insect is more variable than the American ones, as is true of certain English plant genera, *e. g.*, *Rubus* and *Hieracium*.

One of the best tests in all such cases is the transplanting of specimens to different food-plants. Mr. Newstead did this rather extensively in the case of *Pulvinaria ribesiæ*, which he treats as a variety of *P. vitis*. It was found that the *P. ribesiæ* could not live on certain plants which are normally infested by *P. vitis*, and this, I think, should make one hesitate to assume the identity of closely similar forms.

Dactylopus walkeri, Newst., is evidently the British representative of our *D. neomexicanus*, the antennæ and other characters being very similar. In the figure accompanying Newstead's original account of *D. walkeri* the last antennal joint was apparently made too short.

It is strange that no mention whatever is made of *Lecanium liriodendri*, which was described from English specimens.

T. D. A. Cockerell.

SCIENTIFIC JOURNALS AND ARTICLES.

The Popular Science Monthly for March opens with an article on 'Aerial Navigation,' by O. Chanute, which gives a résumé of what has been accomplished up to the present. W. LeConte Stevens discusses 'The Metric System: Shall it be Compulsory?' intimating that it must not be. J. Madison Taylor has a second paper on 'The Conservation of Energy in Those of Advancing Years' and Edward F. Williams has the first of a series of articles on 'The Royal Prussian Academy of Science, Berlin.' N. L. Britton describes 'The Tropical Station at Cinchona, Jamaica,' and Edw. D. Jones discusses 'Education and Industry,' noting the changes that have taken place in training for commercial life. O. F. Cook presents a paper on 'Evolution Not the Origin of Species,' holding that while evolution may change the character of species it does not originate them, this being due to vital motion. Lafayette B. Mendel gives 'Some Historical Aspects of Vegetarianism' and Naohidé Yatsu gives a sketch of 'Tokyo Teikoku Diagaku (Imperial University of Japan).'

The Museums Journal of Great Britain for February contains an article on 'The Museum Question in Europe and America,' by Ant. Fritsch, in which the author notes that many undesirable features are to be found in museum buildings through the undue influence of architects. It is noted that most exhibition collections are too large and a plea is made to have them of smaller size and greater educational value. Alex. M. Rodger describes 'A Method of Mounting Fish with Natural Surroundings,' large, rectangular tanks being employed and the fish preserved in formalin. A meeting is noticed to consider 'The Organization of British Zoologists' and the balance of the number is filled with reviews and notes.

We learn from the *Journal of the American Medical Association* that Dr. K. Kjellberg, of Stockholm, has commenced the publication of a weekly medical journal, to be the official organ for the General Swedish Medical Association. The title is *Almänna Svenska Läkartidningen*. The first two numbers contain instructive articles on 'Arrhenius and the Doctrine of Immunity' and others on Finsen treatment of lupus, paraffin prothesis, etc. The list of collaborators on the journal includes Professor E. Almqvist, J. Borelius, H. Köster and seventeen others. The journal *Eiŗa* was previously the organ of this association, but it suspended publication on the death of its editor, Dr. Simon, last June.

SOCIETIES AND ACADEMIES.

GEOLOGICAL SOCIETY, WASHINGTON.

The one hundred and fiftieth meeting of the society was held January 27.

Mr. Wm. H. Dall read a paper on 'The Miocene of Maryland and its Relations,' in which the relations of the Chesapeake Miocene of Maryland to that of Virginia, North Carolina, Florida and the Miocene of central and northern Europe were elucidated and discussed. This paper will form a chapter in the forthcoming report on the Miocene of Maryland,