distinction between the two methods is fully appreciated.

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QUOTATIONS

CONFIRMATION OF THE EINSTEIN THEORY

EINSTEIN'S theory of relativity has aroused such widespread attention that it may interest your readers to repeat in your columns an announcement which has already appeared in the scientific press.

It will be remembered that Einstein suggested three crucial tests of his theory, which experience could make. The first concerned the movement of the planet Mercury, and had already been satisfactorily made. The second could be made at a total eclipse of the sun, and concerned the bending of light rays from a star; at the eclipse of 1919 the English astronomers obtained a clear answer in favor of the theory, very satisfactorily confirmed by the American observers in 1922. The third test concerned the apparent length of the waves of light as affected by gravitation.

In this third case experiment gave at first very dubious results, some observers even declaring against the effect suggested by the theory. Moreover, some mathematicians challenged the correctness of the inference from the theory, though Einstein never wavered in his declaration that it was a necessary inference. These clouds which have hung about the third test have now been dissipated. Mr. C. E. St. John, of Mount Wilson, who had thrown the gravest doubts on the experimental facts, has now come round definitely in favor of the Einstein result. He makes his own announcement in SCIENCE for September 28. Mr. Evershed (who has just retired from a long and able directorship of the Kodaikanal Observatory in Southern India) had already given very strong evidence in favor of Einstein, but the conversion of Mr. St. John is of obvious importance, and the joint testimony of these former opponents leaves the matter now in no reasonable doubt.

It is satisfactory to review the part that English astronomers have played in the establishment of this development of Newton's great law of gravitation. The Astronomer Royal pointed out, even during the war, the great opportunity of 1919, and English observers hastened to utilize it with success. Professor Eddington was one of the observers, and has played a leading part in the exposition of the new theory. Mr. Evershed stood for some time almost alone as the champion of the third test. We need not underestimate the value of the confirmation by American observers in both cases; but it seems due to those mentioned to remember the courage which secured their priority.—*H. H. Turner, University Observatory, Oxford, in the London Times.*

SCIENTIFIC BOOKS

Fortschritte der Geologie und Paleontologie. Heft 2. *Die Familien der Reptilien.* By FRANZ BARON NOPSCA. 210 pages and VI plates. Gebrüder Borntrager, Berlin, 1923.

MOST of the leaders in vertebrate paleontology have given us their ideas of the proper classification of the reptilia, and this paper adds a valued name to the list. There is no one whose knowledge of the reptilia, living and extinct, is more comprehensive than Dr. Nopsca, and no one whose opinion is more significant. In his paper Dr. Nopsca has brought together twelve suggested classifications which have been offered since 1890 over the names of such men as Cope, Zittel, Fürbringer, Huene, Broom, Watson and others, and to this list he adds his own as the thirteenth. A glance through these classifications illustrates clearly the difficulties inherent in the task; they show many and radical differences of opinion, both in the composition of the various groups and the relative taxonomic rank assigned to each, such as Super-Orders, Orders and Sub-Orders. Certain groups have attained a relative stability as to their content, as the Cotylosauria, Ichthyopterygia, Testudinata, Sauropterygia, Lacertilia, Crocodilia, Dinosauria and Pterosauria, but the taxonomic position is still uncertain and for some, even the content is still in dispute—witness the growing conviction that the Dinosauria is a composite rather than a coherent group, and the recent suggestion that the Pterosauria be divided.

The cause of this difference of opinion is largely due to the fact that each author has considered a different character or group of characters as of capital importance. Happily, classification is based to-day entirely upon genetic relationships, but the material at the disposal of the paleontologist is still too limited to permit a selection of the characters which reveal most accurately this genetic relationship; the personal factor is still prominent in each suggested classification. The most crying need in systematic paleontology to-day is a determination of what structures are fundamental in the development of any phylum and the direction of their evolutionary changes, as opposed to the secondary adaptive changes. Only when these have been determined and generally accepted will we have a consistent and uniform classification; until then each author must produce a mosaic of relationships based upon his individual opinion of the relative importance of certain characters. In the opinion of the author of this review a correct and generally acceptable classification will not be attained until the emphasis is shifted from the form to the

function; when all the factors which have determined the bodily structure have been determined and evaluated.

It is interesting to note that Dr. Nopsca's avowed method of procedure is to work from the end result back to the beginning, rather than from the simple, comprehensive type towards the highly specialized. Neither method can be entirely successful until far more material is collected and studied, but it may be seriously questioned whether a start with the primitive forms does not make it far more possible to determine fundamental structures and changes than to start with the most aberrant forms where the lines of genetic relationship are obscured by secondary adaptations, possible parallelisms, convergences and polyphyletism.

Dr. Nopsca offers us a careful comparative analysis of the structure of 25 forms which he considers the most aberrant or specialized; from this study he suggests a classification which contains ten Super-Orders, one of which is new, the Dranitesauria; 21 Orders, of which two, the Rhizosauria and Chainosauria, are new; and a correspondingly large number of sub-Orders and Families. In this arrangement we have a clear illustration of the unfortunate lack of uniformity; other authors are best satisfied to express conceived relationships by groups of lesser rank. To the experienced worker such shifts in the rank of groups means little, but to the student, to whom an Order is a positive concept, the matter is most confusing.

As is natural, Dr. Nopsca's opinions lead to a new mosaic of relationships, and, in the opinion of some, to strange fellowships among the reptilia. We find the Thallatosauria grouped with the Pelycosauria, the Mesosauria with the Ichthyosauria and the Family Caseidae next to the Edaphosauridae.

As a part of his paper, Dr. Nopsca gives us a valuable review of the known reptilian footprints and more or less closely allocates each to distinct families or even genera. This discussion is most helpful and illuminating, but one hesitates to concede the accuracy of some of his suggestions, as when animals known only from distant regions are suggested as the makers of footprints found in England.

It is an interesting commentary on the breadth of the work in modern morphology that Dr. Nopsca speculates upon the effect of vitamines and hormones upon the development of Paleozoic and Mesozoic reptiles. This is but one of many evidences that the mere comparison of parts is no longer sufficient to him who would determine the genetic relationships which alone can form the basis of a true phylogeny. Physiology, environment, function—all these must be considered to have their share and must be read in the shape of the bones and in the sediments which reveal the environment during life of the animal remains there buried.

Dr. Nopsca's work is a most valuable contribution to the history of the reptilia, filled with information and abounding in suggestive interpretations.

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SPECIAL ARTICLES

THE EFFECT OF FORMALDEHYDE UPON THE VITAMIN CONTENT OF MILK

THE desirability of a wholesome milk supply for every household is, of course, granted by every one. Common experience and scientific investigation have both shown the unquestioned value of milk in the diet, particularly for the child. The great problem to be solved, however, is that of bringing the milk from the producing dairy to the consumer within such time and under such conditions as to prevent harmful changes in the milk before its utilization. To meet the situation various methods have been proposed and carried out, the ideal one being the cleanliness and icing method that results in "certified" milk. Unfortunately, the necessary expense of such a method makes the product cost so much that it is only comparatively few who are able to use such a product for the family supply. The more common method is that of pasteurization, and its value as a method of insuring a useful milk for home consumption is not to be questioned.

However, investigators and dieticians are fairly well agreed that the process of pasteurizing is not without its drawbacks. It is conceded that the process results in the destruction of at least one vitamin to a very large extent, and most workers feel that the other vitamins also are depleted. This would, perhaps, not be a serious drawback if the milk were to be used by adults using an otherwise satisfactory mixed diet, but when the milk is to be used as the sole article of the baby's diet then the question does become an acute one. Usually, such a diet is supplemented by fruit juices or other similar sources of vitamins under such conditions. Nevertheless, thousands of babies, whose parents never heard of vitamins, are given the insufficient pasteurized milk with disastrous results.

Knowing the preservative value of formaldehyde, the following work was carried out within the past year to determine its possible usefulness in preventing undesirable changes in milk. T. M. Price,[2] working

[1] From the Department of Physiology, Ohio State University.

[2] T. M. Price, Centr. Bakt. Par., Abt. 2, 1905, 14, 65–75.