

is true of every concrete case of knowledge which we possess. Its detailed working out would be a metaphysics of knowledge, an epistemology.

Since knowledge is the successful systematization of the implications which are disclosed in things by virtue of consciousness, a second logical problem of fundamental importance is the determination of the most general types of implication with the categories which underlie them. The execution of this problem would naturally involve, as subsidiary, the greater part of formal and symbolic logic. Indeed, vital doctrines of the syllogism, of definition, of formal inference, of the calculus of classes and propositions, of the logic of relations, appear to be bound up ultimately with a doctrine of categories; for it is only a recognition of basal types of existence with their implications, that can save these doctrines from mere formalism. These types of existence or categories are not to be regarded as free creations or as the contributions of the mind to experience. There is no 'deduction' of them possible. They must be discovered in the actual progress of knowledge itself, and I see no reason to suppose that their number is necessarily fixed, or that we should necessarily be in possession of all of them. It is requisite, however, that in every case categories should be incapable of reduction to each other.

A doctrine of categories seems to me to be of the greatest importance in the systematization of knowledge, for no problem of relation is even statable correctly, before the type of existence to which its terms belong has been first determined. I submit one illustration to reinforce this general statement, namely, the relation of mind to body. If mind and body belong to the same type of existence, we have one set of problems on our hands, but if they do not, we have an entirely different set. Yet vol-

umes of discussion written on this subject have abounded in confusion, simply because they have regarded mind and body as belonging to radically different types of existence and yet related in terms of the type to which one of them belongs. The doctrine of 'parallelism' is, perhaps, the epitome of this confusion.

The doctrine of categories will involve not only the greater part of formal and symbolic logic, but will undoubtedly carry the logician into the doctrine of method. Here it is to be hoped that recent tendencies will result in effectively breaking down the artificial distinctions which have prevailed between deduction and induction. Differences in method do not result from differences in points of departure, or between the universal and the particular, but from the categories, again, which give the method direction and aim, and result in different types of synthesis. In this direction, the logician may hope for an approximately correct classification of the various departments of knowledge. Such a classification is, perhaps, the ideal of logical theory.

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CLARENCE L. HERRICK.

THE death of Professor Clarence L. Herrick September 15 in New Mexico was noted in SCIENCE for September 23. In him neurology and geology alike have lost a brilliant investigator and a teacher of rare power.

His scientific work began in the high school. During his college course at the University of Minnesota, where he graduated in 1880, he was employed on the Natural History Survey of the state and for five years following he was actively connected with this work, completing a large quarto on the Mammals of Minnesota in 1885. From 1884 to 1889 and again from

1892 to 1894 he held a professorship at Denison University. Here he continued his zoological studies, but in connection with his class work became interested in the Waverly limestones and shales of Ohio. He devoted himself to the study of these for several years with characteristic intensity, publishing most of his results and those of his students in the *Bulletin of the Scientific Laboratories of Denison University*, which he founded in 1885. From the first his teaching was extraordinarily successful, particularly in kindling enthusiasm and love of research. This was due partly to his attractive personality, partly to his fearless originality, but chiefly to his philosophic insight and his ability to open up his deepest thinking even to elementary pupils. And so a very large proportion of his students have themselves achieved success as original workers in science.

During his last ten years, spent in New Mexico on account of the breakdown in health which forced him to leave Ohio, he resumed his geological studies, publishing several important articles on the geology of that territory.

From 1889 to 1891 he was professor of zoology in the University of Cincinnati. Here his geological labors were interrupted and he entered with great energy into a series of neurological investigations which he had long before planned to undertake. He founded the *Journal of Comparative Neurology and Psychology*, which (now under the editorship of his brother, C. Judson Herrick) has made a permanent and important place for itself. Beginning his neurological work upon the brain of rodents, he accumulated a large mass of data which he found almost incapable of correlation. Believing that the key could be found only in lower primitive types he began to examine a large number of such in a very thorough manner. His results were published rapidly and with little at-

tempt at correlation. These papers were illustrated by large numbers of beautiful plates which his rapid and skillful use of the pencil made possible. His plan was to secure a large amount of accurate data while his eyesight was still perfect, and later review the whole field of vertebrate neurology, using his own observations as a nucleus around which to build a unified system by further research at critical points. In 1892, after some months of study abroad, he returned to Denison and continued his neurological work with great energy, until in December 1893 failing health compelled him to go to New Mexico. He soon recovered sufficiently to resume work, but local conditions were such that his attention was again directed mainly to geological problems. The work of correlating his neurological studies was left somewhat incomplete, but it is probable that this may be accomplished through the labors of his brain-children.

For four years he did a useful work as president of the University of New Mexico, here as everywhere stimulating young men to undertake research by the influence of his own example. In these later years we see the successful struggle of a noble soul dominated by a great purpose over the discouragements of physical weakness and suffering.

A. D. COLE.

#### SCIENTIFIC BOOKS.

*The Harriman Alaska Expedition.* Vols. VIII. and IX., Insects. New York, Doubleday, Page & Co. 1904.

Volumes VIII. and IX. of the Harriman Alaska Expedition, published in cooperation with the Washington Academy of Sciences and dealing with the subject of insects, have just been issued, and represent the most notable contribution to the literature of entomology of the year, and will rank among the most important of the American contributions to this subject. The material discussed in these two volumes was substantially all of it col-