The Relation between the Nerves of Taste and Touch in Fishes: C. Judson Herrick, Denison University.

It has been shown that certain teleosts, notably catfish and carp, are provided with taste buds freely distributed in the outer skin, that the fishes taste with these organs and habitually localize their food by the combined action of cutaneous organs of touch and taste. Inasmuch as these sense organs belong to totally distinct systems (somatic and visceral, respectively) whose peripheral nerves and primary cerebral centers are wholly unrelated, considerable interest attaches to the question of the central relations of the tactile and gustatory systems of neurones with one another. The gustatory reflex paths within the brains of these fishes have been fully worked out, and the present paper reports the discovery of a broad and complex area of correlation with the tactile centers in the funicular nuclei at the lower end of the medulla oblongata.

The Problem of Wing Origin and its Significance in Insect Phylogeny: Herbert Osborn, Ohio State University.

The origin of the insect wing is a difficult problem to solve, since on account of its antiquity the evidence, both morphological and developmental, is much obscured. Fossil forms show the occurrence of winged insects as far back as the Paleozoic, and the structure must, of course, have arisen at some time prior to or during that period. The reduction of types of venation to a common form indicates a common origin for wings of all orders, and the inclusion of tracheæ suggests a respiratory function. A respiratory function indicates aquatic life in the ancestral form, a suggestion which is corroborated by the method of musculature and the development so far as it can be traced. That they are not to be associated with any existing forms of aquatic insects is believed to be shown by the secondary character of aquatic adaptation of modern orders. The explanation of aquatic origin becomes conceivable, however, if we assume a primitive tracheate form, perhaps peripatoid in character, which became adapted to aquatic life before or during Paleozoic time, this primitive aquatic form returning to terrestrial habit and the tracheated respiratory gills being modified to wings. Of the existing orders then arising, some have become in part or quite entirely aquatic by adaptation in more recent time. Diagrams indicating the appearance of the different orders of insects in time and their lines of derivation as suggested by this conception of the evolution of the Pterygota were shown.

C. Judson Herrick,
Secretary.

SCIENTIFIC BOOKS.

The Elements of Psychology. By Edward L. Thorndike. Pp. xix + 351. New York, A. G. Seiler. 1905.

Hardly a year passes now-a-days without the appearance of several new text-books of psychology. One's first impression in noting this fact is that there must be as yet in this still youthful science comparatively little agreement among its individual expositors as to the body of facts to be presented, or as to the laws which account for the existence of the facts, or as to the best manner of presentation. Professor James, indeed, in a justifiably laudatory introduction to this book by Thorndike, maintains that these many text-books "so far as students go, are practical equivalents for each other. * * * The differences in them are largely of order and emphasis, or of fondness on the authors' parts for certain phrases, or for their own method of approach to particular questions. It is one and the same body of facts with which they all make us acquainted." This is certainly true. There is a large body of facts with respect to which there is general agreement. Yet after all, the mere presentation of facts

in their isolation is one of the least important of the functions of a text-book. What are the great all-embracing laws which bind these facts together into the orderly unity of an individual life and of the universe of conscious facts; what is the solution of the old disputed problems concerning determinism and indeterminism, parallelism and interaction; what are the ultimate elements out of which every moment and kind of consciousness is constructed, and in what sense do they exist; which ones of the established and of the assumed facts need emphasis in order to convince the elementary student of the truth of these unifying principles, and to make his knowledge of laws and of facts of real value to him by enabling him to better understand his daily life—these are questions of fundamental importance to the very existence of psychology as a true science, and are yet the very ones in regard to whose solution there does not seem to be practical agreement among psychologists. That the teachers of the science feel this is evidenced both by the number of them who publish text-books of their own, and by the eagerness with which, if we may trust the announcements of publishing firms, a new text-book is adopted widely in the hope that it may prove more satisfactory than the last.

These matters of ultimate theory and of emphasis are apparently of decisive importance in determining the selection of a text-book; and the ideal text-book in these respects seems not yet to have appeared. To the present reviewer Professor Thorndike's book seems to approach it in more important respects than any other. The reviewer regrets the absence of any or sufficient discussion of many principles and facts that seem to him of essential importance. But it would be only on grounds of preferred emphasis that he would criticize the book, and as this is purely a matter of individual opinion, criticism may well be dispensed with, and the more striking merits of the book alone pointed out.

The book is designed, as its author says, 'to serve as a text-book for students who have had no previous training in psychology, who will not in nine cases out of ten take any considerable amount of advanced work in psychology, and who need psychological knowledge and insight to fit them to study, not the special theories of philosophy, but the general facts of human nature.' Professor Thorndike is a born teacher, as well as an able investigator, and he has accomplished his task well. His treatment of the subject is given under three main headings. In Part I, he deals with descriptive or structural psychology and in it 'the rich variety of human thought and feeling is shown to be divisible into three natural groups: first, feelings of direct experience; second, reproductions of direct experience; and third, feelings meaning or referring to direct experience.' This is, perhaps, in its analytical thoroughness, the least satisfactory portion of the book. In Part II. he discusses 'the tremendously complex physical basis of mental life, the nervous system,' with the aid of numerous photographs and drawings, in accordance with the most recent views, and with the aim of furnishing the student with a conception of it which shall be truly explanatory with reference to mental facts. Part III. is concerned with dynamic or functional psychology, and presents admirably the laws which account for the psychologically important bodily activities, and for the occurrence and sequence of mental states. In his selection and manner of statement of the facts he is throughout apt, clear and connected. In addition to the simplicity and clearness of his account, one is struck forcibly and favorably by the wealth of helpful illustrations, of practical applications and of useful and well-chosen exercises. Any teacher of psychology who, instead of preparing a text-book for himself, prefers to use that of some one else, supplemented by his own lectures, may feel confident that no other is better suited to his purpose than this. It not only ensures to the student a clear grasp of the science as a theoretical whole, but is well calculated to make it vital and real to him, and helpful in the understanding and conduct of his own practical life.

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