

KEEWATIN OF EASTERN CENTRAL MINNESOTA.

C. W. HALL, Minneapolis, Minn.

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GEOLOGY OF QUEBEC CITY AND ITS ENVIRONS.

HENRY M. AMI, Ottawa, Canada.

GAS-WELL SECTIONS IN THE UPPER MOHAWK VALLEY AND CENTRAL NEW YORK.

CHARLES S. PROSSER, Columbus, Ohio.

VERTEBRATE FOOTPRINTS IN CARBONIFEROUS ROCKS OF WRENTHAM, MASS.

J. B. WOODWORTH, Cambridge, Mass.

About seventy fellows were in attendance and the meeting was a large and in every way an enjoyable one. The Fellows resident in Washington spared neither effort nor expense in entertaining the visitors, and the vote of thanks passed at the final session was a very sincere expression of a deeply felt sentiment.

In the above report the notes for the first three days were prepared by J. F. Kemp, those for the last day by A. S. Eakle.

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SCIENTIFIC BOOKS.

Electro-physiology. By W. BIEDERMANN. Professor of Physiology in Jena. Translated by FRANCES A. WELBY. Macmillan & Co. Vol. II., pp. 500.

Miss Welby's translation of the first volume of this well-known work was reviewed some time ago in these columns. It treated of the structure, contraction, and electrical stimulation of muscle, and of the electromotive phenomena of muscle, epithelium and glandular tissue. The second volume, comprising the structure, conductivity, excitability and electrical stimulation of nerve and the electromotive phenomena of nerve, electrical organ and vegetable cells, has now appeared.

When a physiologist of Professor Biedermann's eminence sums up the results of that department of the science which he has so brilliantly illustrated by the labors of a lifetime, and, knowing well how comparatively narrow will be the circle of his readers, lays his contribution at the feet of his fellow-workers, it may seem ungracious to criticise the gift. Yet we are bound to say, if criticism is not to abdicate its function, that praise must be tempered with censure in passing judgment on this book. That it is full of interesting and important observations, it is unnecessary to say. Even if the author had contented himself with an account of his own experiments this could not fail to be the case. But the treatment of the subject is not always so clear as might have been expected from so great a master. Unnecessary difficulties are placed in the way of the reader by the intricacies of a somewhat diffuse and ponderous style. The lack of proportion and perspective is conspicuous. The author, while doubtless himself well able to discriminate between the importance of weighty generalizations and that of petty experimental details, apparently makes little effort to help his reader to do so, and the student sometimes rises from the perusal with the feeling that he cannot see the wood for the trees.

The author naively admits, in the preface to his first volume, that he has not attempted to avoid partisanship in the treatment of certain topics which have given rise to the liveliest discussion and have separated electro-physiologists into warring camps. He has preferred, as he says, to present these thorny problems from the point of view of his master Hering, which happens also to be his own. The candor of this avowal almost disarms criticism. Yet we must say that although in a sketch such an attitude might be entirely excusable and even praiseworthy, it is to be doubted whether in a professedly exhaustive treatise like the present it is well to skate so lightly over the thin ice of controversy. For it is often impossible to thoroughly understand a question without a knowledge of the history of the disputes that have arisen in regard to it.

Like most of his countrymen, the author scarcely does justice to foreign and especially to

English-speaking physiologists. For instance, in speaking of the electrical variation produced when the retina is stimulated by light, the fundamental observations of Holmgren and of Dewar and McKendrick receive scant mention in comparison with the later, though doubtless valuable results of Kühne.

Of certain other sins of omission the candid critic has cause to complain. In a work of nearly 1000 large pages one would expect to find a highly special branch of physiology presented in an exhaustive way. Yet certain parts of the subject, and these not the least important, are barely sketched, while hundreds of pages are occupied with extraneous matter, or at least with matter which has no particular claim to be included. Why, for instance, should the structure of muscle and nerve, which is so much better treated in histological or anatomical works, cover over 60 pages, the discussion of the conductivity and excitability of nerve 60 more, and the alterations in form of the contracting muscle an additional hundred, while the secondary electromotive phenomena of nerve are dismissed in a bare half dozen pages?

Again, more than 50 pages are given up to the anatomy and histology of the electrical fishes, almost exactly as much space as is devoted to their electrical phenomena.

But although it is not free from faults, the book is a notable contribution to physiology, copious in its information, usually balanced in its judgments, and suggestive in the rare cases in which the author permits himself to speculate. The protest against Boruttau's extravagant hypothesis, which so completely identifies the negative variation with a physical katelectrotonus propagated in the form of a wave, seems to us entirely justified, and the arguments by which the protest is supported particularly cogent.

The translation is upon the whole well done, and better, we think, in the second volume than the first. Of course, as in all translations, there are a few cumbrous renderings which might be improved, and as in most, a few places where the meaning of the author is not expressed or is actually perverted. Occasionally a plural is inaccurately rendered by a singular. Not infrequently the otherwise com-

mendable love of terseness on the part of the translator has led to the omission of qualifying words which it would have been better to translate. As a rule, however, the Anglo-Saxon pruning-knife has been advantageously employed to redress the diffuseness of Teutonic style. The division of the chapters by secondary headings, scarcely attempted in the original, is a great improvement. But it is to be regretted that the weightiest conclusions, expressed in German in spaced type, should not have been similarly indicated in the translation.

In a new edition, which we hope may soon be called for, such errors as the following ought not to remain uncorrected: 'Sewing needle' for 'Stricknadel' (p. 37); 'become paler in color' for 'einen blasseren Farbenton annehmen' (p. 37); 'inequalities' for 'Unvollständigkeit' (p. 38); 'near the constrictions' for 'nebst den Schnürringen' (p. 42); 'the middle part of the nerve rests upon the electrodes' for 'auf genau gleichen Elektroden ruht die centrale Nervenstrecke' (p. 62); 'itself' for 'daher' (p. 69); 'the strength of the peripheral stimulus is the most important factor in the diffusion of irradiation' for 'ist die Stärke des peripheren Reizes von wesentlichem Einfluss, etc.' (p. 70); 'the organ of reflexes, the automatic central structure of the brain and spinal cord' for 'die reflexübertragenden und automatischen Centralapparate, etc.' (p. 78); 'built up' for 'geschlossen' (p. 87); 'exactly measurable' for 'genau abstufbaren' (p. 89); 'similarity' for 'Verschiedenheit' (p. 110) (doubtless a slip); 'differences of chemical reaction' for 'Verschiedenheit des Chemismus' (p. 111); 'the capacity of reaction, or alteration' for 'die Reaktionsfähigkeit, beziehungsweise Veränderungen derselben' (p. 111); 'when the action of curara has quite worn off' for 'wenn die volle Wirkung des Curare * * * nachliess' (p. 112). On page 199 we read: "Against the cogency of these experiments there is good evidence to indicate that the electrical taste depends not upon electrolysis of the fluids in the mouth, but upon direct excitation of the taste-nerves." This is the direct opposite of the statement in the original. On page 109 curiosity is awakened by the mention of induction currents "applied directly to a fresh section on the ventral surface of the

frog's spinal cord," but it is set at rest when we learn from the original that they were applied on the ventral surface of the spinal cord in the immediate neighborhood of a fresh cross-section. Again, some astonishment is caused by finding (on p. 51) that "one important fact that has hitherto been *overlooked* is the marked variation in calibre of medullated nerve-fibers." We ask ourselves whether it is possible that Biedermann did not know of the long series of investigations on this subject, beginning with those of Bidder and Volkmann half a century ago, and continued in our own day by Gaskell and his pupils and numerous other workers? On turning to the original, however, we find that Biedermann's innocent statement is that this important fact has not yet been '*mentioned*' (erwähnt) in his description. Similarly the at first sight somewhat mystifying contention of Grützner and Tigerstedt (p. 311) "that certain forms, perhaps, indeed, all opening twitches, produced by negative polarization currents are really closing twitches," becomes perfectly rational as a contention "dass gewisse Formen, ja vielleicht alle Oeffnungszuckungen durch den negativen Polarizationsstrom verursachte Schliessungszuckungen sind," which, being interpreted, means "that certain forms, indeed perhaps all opening twitches, are closing twitches produced by the negative polarization currents."

G. N. I. S.

Text-book of the Embryology of the Invertebrates.

By DR. E. KORSCHULT and DR. K. HEIDER. Translated from the German by MATILDA BERNARD, revised and edited with additional notes by MARTIN F. WOODWARD. Vols. II. and III. London, Swan, Sonnenschein & Co.; New York, The Macmillan Co. 1899.

The admirable text-book of Invertebrate Embryology by Drs. Korschelt and Heider is scarcely in need of recommendation at this late day. If embryologists owe a debt of gratitude to Professor Mark and Dr. Woodworth for the translation of the first volume of the work, their obligations are even greater to those who have undertaken the more arduous task of translating the three remaining volumes. The two volumes just published contain the development of the Phoronidea, Bryozoa, Brachiopoda,

Crustacea and Insecta. Those volumes have been made of equal size by an adroit transposition of some of the chapters of the original text. One notes with pleasure the abolition of the oft recurring word 'fundamental' which the translators of the first volume used in the place of the German word 'Anlage.' As some embryologists have of late been much distressed about the proper translation of this term, it may be well to repeat Mr. Woodward's eminently sensible remarks on the subject. He says: "Exception, with which I concur, has already been taken to the use of this term [fundament], on the ground that the word fundament implies the solid basis or foundation upon which a structure rests or is built, where as an 'Anlage' is essentially a changing, growing structure, which, though at one time the foundation, when only the foundation exists, eventually gives rise to, or rather itself becomes transformed into, the fully formed organ."

"Having thus decided against the continued use of this term, I found myself face to face with the responsibility of selecting one of the numerous terms which have at one time and another been put forward as the English equivalent of 'Anlage,' at the same time knowing full well that, whichever word was adopted, I should find a large number of biologists against me, as nearly every teacher of note has proposed at least one word which he believes to be the only correct rendering of 'Anlage.'"

"Realizing, then, the impossibility of satisfying everyone, I thought it advisable to pass over all the numerous terms which have been recently suggested, none of which are really satisfactory, and to revert to that much abused word—rudiment. Most biologists will agree that the term rudiment, if it had not been misused by some of our most eminent zoologists, would undoubtedly be the best word by which we could render the German term 'Anlage.' Unfortunately, following the lead of Darwin and others, we have acquired the habit of applying the terms rudiment and rudimentary to certain structures present in the adult, which, in consequence of their small size and frequent loss of function, have retained a somewhat embryonic stamp, thus preserving the outward appearance of a rudiment, but losing its essential