

As this volume will, in all probability, close the collection of Sumner's printed works in the line of essays and short pieces, those who can assist us in securing available materials will confer a substantial favor.

ALBERT G. KELLER

LEST WE FORGET

TO THE EDITOR OF SCIENCE: The new administration, with democratic majorities in both house and senate, was entrusted with power in the belief that it will be responsive to the needs and demands of the people. But in the various programs suggested for the amelioration of present-day abuses nowhere has any mention been made of the early adoption of the metric system as an obligatory system in this country, accompanied by the destruction of the old systems. The writer has reached that second childhood when, at the request of his children for aid in doing their "sums," he must again wade through the chapters in the arithmetic devoted to the various tables of hodge-podge units, and he realizes, as never before, the truth of the statement that the whole thing is "a wickedly brain-destroying piece of bondage under which we suffer."

To see young minds eager for the study of live subjects forced to work hundreds of useless problems in this treadmill of heterogeneous dead and dying units is enough to rouse the ire of any one against those selfish interests which are blocking the way of reform.

When we consider the situation candidly we must acknowledge that the matter is one of extreme importance. A great part of the under-weight and false-measure frauds are directly due to our confused system of units, and on the adoption of the metric system under such protective regulations as are in force in Germany, for example, a tremendous saving would be effected in the cost of living to wage earners especially. Can not all scientists, who understand so well the merits of the metric system, rouse themselves and make a strong effort to have the bill passed which has been before congress for many years, backed by the various government bureaus

and reform leagues? It took thirty years to obtain the parcel post; must we wait that long? Or can we not make a long pull, a strong pull, and a pull all together, and get it through next winter?

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TO WHOM IS THE ACADEMIC COSTUME WORTH WHILE?

TO THE EDITOR OF SCIENCE: Even if we disagree on the use of medieval costume in modern institutions as a matter of academic good taste, may we not set our faces against any participation in the decision by a commercial propaganda aiming to extract large profits from members of an underpaid profession?

T.

SCIENTIFIC BOOKS

Cambrian Brachiopoda. By CHARLES D. WALCOTT. Monograph U. S. Geological Survey, Vol. 51. Part I., Text. Part II., Plates. 1912. Pp. 872, 76 text figures, 104 plates.

The dominating impression which this extraordinary work leaves upon one who runs a hasty eye over its pages and luxurious plates, is that of the marvelous industry and enthusiasm of its author. If the paleontological genius who controlled these facts here assembled had nothing else to do, the wonder might be less. But amid the responsibilities of a great office and affairs of widest scientific concern, the writer of this book seems to let no minutes go to waste which can be made to forward his expositions of that field in paleontology of which he has long been the most effective illuminator.

Here are two quarto volumes devoted, by title at least, exclusively to the Brachiopods of the Cambrian fauna. Nearly twenty years ago students of this multitudinous, variant group of animals believed the sum of knowledge concerning them enough to justify a treatise on the broad lines of their generic characters, so Professor James Hall and his assistant published two big quartos on this subject, therein searching out every nook and cranny that might afford traits of generic sig-

nificance in all known or available forms of these creatures. Even to such a study the Cambrian brachiopods cut a very modest figure in paleontology. Specimens were few, their structures were obscure, and hence their relations were difficult to interpret; most of the available material was poorly preserved and, as a whole, they played a dubious rôle in the generic history of the entire class as well as in the total of the Cambrian fauna.

In this new book the student may scan 104 crowded plates of the Cambrian Brachiopods, bearing from 3,000 to 4,000 figures, and after the first bewilderment has passed, he comes to the realization that at last a definite progress has been made in the census, the analysis and estimate of the morphology and biologic worth of these early and hence most significant organisms.

The columns of SCIENCE are hardly the place for a critical study of Dr. Walcott's results or a measurement of their advance over previous knowledge. The author's publications on various aspects of the Cambrian fauna have been as startling as rifle shots and as effective in opening our eyes to the unexpected development of life within this field. With this book before us, inherited and acquired notions of the paucity of life in this "primordial" age of the earth are forever swept aside. The present panorama of the Cambrian Brachiopod fauna is simple in aspect but numerically comparable to the brachiopod element in any later geological age. At any rate here are listed about six hundred species and only the census taker for the class would dare say how far any single subsequent period has overpassed that number. As against their successors in the later rocks they lack in diversity of expression, for these are simple, sturdy, coherent types, largely devoid of the sudden and fugitive variations which accompany the tachygenic, arrested and declining stages in succeeding faunas. The author had the courage, years ago, to break the restraints of geography and politics and to content himself with nothing less than the earth for his field. Above a thousand localities are cited in his lists here and it is the Cambrian terrane of the

world which the author has been enabled to reach through many direct and indirect avenues; yet the substantial basis of the work is his own discoveries in regions of his own exploiting.

It is probably not the proper business of a notice of this work to analyze the part it has played in the ecology of the author, but the author is, for the moment, impersonal as is any author who may have achieved so tremendous an addition to the details of scientific fact. These kernels of knowledge are not easy to assimilate, they seem to go hard with even the spiritually minded seeker after all truth, and one may be disposed to wonder if the joy of discovery, the sense of contribution, the rebound of satisfaction which comes with each new determination of fact, is not the great reward in such achievement. But here let us go slowly. If the whole truth were to be known and the real underlying genius of life could be indisputably portrayed, I presume the difference between *Lingulella cuneola* and *Lingulella desiderata* might prove to be as vital in the Grand Plan and to the Sum of Happiness, as the winning or losing of a congressional appropriation for a museum of industry. Nevertheless, no man can be so deeply conscious of the worth of such a work as the man who did it; no one can appreciate so well the broader bearings of such a monumental increase of human knowledge. Fortunately it is not of the sort that has to be applied to meet human expediences. Hence its glorious justification.

The greater volume of the text of this work is given over to the descriptions of the species, but there are preliminary chapters of broader scope, among them none more suggestive than the analysis of differential shell structures. Following Beecher's broader classification of the brachiopods, based on the characters of the pedicle passage, *Atremata*, *Neotremata* and *Protremata* (the first and second corresponding to Huxley's *Inarticulata*, and the third to the *Articulata*) the majority of species and genera are *Atremata*, and they, with the *Neotremata*, are as much in excess of the rest here as they are over-

passed by the higher *Protremata* in the later faunas. This is as it should be, for they are diverse expressions of the simplest brachiopod structure. Broadly speaking, regardless of their multitude, the species of the major divisions are all oboloid or linguloid in outline. The disk of the oboloids has been oft repeated in the geological history of the brachiopods, though it has served to mask widely distinct genera; but as for the sharpened *Lingula*-form—it would seem there was a divinity that shaped its end, for it has come down to this day without much change, just enough in fact to let us say that no true *Lingula* existed in Paleozoic time, hard as it might be to prove it. One can not restrain surprise at the beauty of retention of much of this material, the perfection of shell structure, of pallial venation, ovarian and muscular impressions, set forth on the plates by extremely effective mechanical processes of illustration. The quality of this illustration is most admirable, and it would seem that the personal error of portraiture has been here reduced to its lowest terms.

Should one, on cursory examination of this host of newcomers in paleontology, wondering over their relationships, their phylogeny and precedence, venture to whisper to himself of *Orusia eurekensis* or *Otusua utahensis*—who was its father? who was its mother? had it a sister? had it a brother?—these wisely suppressed inquiries are answered on page 317, which graphically sets forth the presumed derivative relations of the genera discussed. This page is exceedingly instructive. Beecher found the brachiopod radicle best expressed in the Cambrian genus *Paterina*, and his proposition still holds pretty well under these later studies. Walcott's radicle is hypothetic and Precambrian, and its most direct expression and outcome is his genus *Rustella* which, leaving no successors (in this table), stands out in independence as the fortified protogulum adult. Nearest to this in close collateral development stands *Paterina*, a durable genus reaching nearly through all Cambrian beds. From a distinct collateral descend the oboloids and in a near-by line, but distinct as far

as it has been tracked, the linguloids. These three lines constitute the main stocks of the *Atremata*.

The *Neotremata* with definite cardinal surfaces (such genera as *Acrotreta*, *Acrothele*, *Trematobolus*) indicate no marked convergence toward the *Atremata*. Mr. Walcott unites them close to the Precambrian radicle. This also he does with the *Protremata* (*Billingsella*, *Syntrophia*, etc.). Indeed, one of the striking features of this table is its palpable absence of evidence of Cambrian convergence in the three great subclasses.

In 1892-94, when Hall and Clarke's "Introduction to the Study of the Genera of Paleozoic Brachiopoda" and "Introduction to the Study of the Brachiopoda" appeared, there were 28 recognized Cambrian genera. Dr. Walcott presents a total of 49 genera and subgenera of *Atremata* and *Neotremata* from the Cambrian. But it is to be noted that, notwithstanding its title, the work is not exclusively given over to the Cambrian faunas. The author has included a number of related genera and species, of all three subclasses, from the Ordovician, which help to make clearer the relations and range of these primitive expressions.

The scientific public knows that even with this vast contribution to our knowledge of the Cambrian fauna, Dr. Walcott's work is very far from complete. We have been let far enough into his accumulated Cambrian treasures to realize that his brachiopod book is but a foretaste, an intimation of the whole fauna under his eye. We can not restrain amazement at the tremendous expansion of ideas regarding the profusion and diversity of the Cambrian fauna which has followed the work of his hands. It is his own fault if we are led daily to expect the unexpected from this rich depository of life. In beauty and excellence of preservation the Cambrian beds of the Canadian Rockies, which he has especially upturned, surpass nearly all deposits of a later date, and with the light that they have cast upon familiar organisms long known to us from later beds, we have now to rehabilitate many familiar conceptions. In ultimate

significance the bearing of these investigations on the life conditions which preceded the Cambrian, is far-reaching, and must pave the way to a repair of our conceptions of it and gives us, too, a certain hope that unremitted diligence may bring to our distinguished protagonist of Precambrian life a sure and firm reward.

JOHN M. CLARKE

Nutritional Physiology. By PERCY G. STILES, Assistant Professor of Physiology in Simmons College; Instructor in Physiology and Personal Hygiene in the Massachusetts Institute of Technology, Boston. 12mo of 271 pages, illustrated. Philadelphia and London, W. B. Saunders Company. 1912. Cloth. \$1.25 net.

This little volume is a most welcome addition to the literature of nutrition. It is seldom that as much information of a reliable and useful kind is condensed in a publication of this size. The author well states that "the making of the book has been a study in elimination." He also states that it is intended to be used with other books and suggests the desirability of supplementary reading upon general biology, human anatomy, food chemistry and dietetics. We are informed that the keyword of the discussion is energy. The author has given us a careful and discriminating study of the best existing scientific evidence related to the physiological phases of human nutrition and he has treated his subject in language that is notably clear. His discussion is well organized and he has exercised a reasonable caution in his affirmations. Chemical formulæ and minute details have been excluded from the text and "used but sparingly in the notes," for "a certain preliminary knowledge of elementary science is assumed." The volume deals with processes rather than with chemical or physiological details. For instance, in discussing the unlikeness of the individual proteins on the basis of the "building stones" into which they may be separated, no detailed list is given of the protein cleavage products, but at the same time the general bearing of the knowledge we now have

in regard to protein cleavage and the nutritive relation of single food proteins upon the development of body proteins is clearly and fully presented. The origin of urea is discussed, but it is assumed that the student is familiar with the chemical reactions involved. In fact, we have presented to us the philosophy of nutrition minus minute chemical and physiological details. The evident intention is to give to the student a point of view and this purpose is accomplished with eminent success.

One of the characteristic features of this book is the type of illustrations used in order to make clear certain metabolic processes and nutritive relations. For instance, in dealing with the difference in the constructive value of the individual proteins, comparison is made to a house that is pulled down in order that another may be erected from its timbers. "If the second house is of an architecture entirely unlike that of the first, there will be many unavailable pieces to discard and the new building will be smaller than the old. It is not at all unlikely that the misfit fragments of building material will go into the cellar of the new house, later to be used as fuel. This is just what the body does." The structure of a molecule of food protein is also compared to type set up in a printed page. If this type is allowed to fall apart, it is a symbol of digestion and unless this is used to set up again exactly the same matter, there will be unused letters, just as in the human body protein building stones will be used for fuel purposes and not for construction unless the food proteins and the body proteins are alike in constitution. Familiar illustrations of this apt character are frequently used throughout the volume.

If any one portion of this volume is to be commended above another, it is the chapter upon the hygiene of nutrition. Though covering but twenty-three pages, this chapter has more value in its relation to practical dietetics than some whole volumes written by a less scholarly and discriminating author. In discussing nervous conditions as relating to digestion, some space is given to the treatment