liquids in the diet. Such investigations as have been made do not bear out this statement. Nuts are said to be of little value as food, but their composition and digestibility show them to be highly nutritious. Fish is classed as "an economical kind of protein food." This may be true of certain species, especially when salted or smoked, but some species when bought in the fresh condition, as for instance blue fish, furnish a very expensive diet, much more so than even the expensive meats.

Gravity cream is said to contain 16 per cent. of fat. If the term "gravity" is used in the usual sense as applied to cream raised by deep setting and pan setting, then under some conditions it would contain double that percentage of fat and even more. Cream does not have a uniform composition, but varies greatly according to conditions.

It is hardly necessary to multiply these references. There is running through the first part of the volume, which relates to the general principles of nutrition, a general tendency to inaccuracy and indefiniteness of statement. For the purposes of instruction, the language might wisely be condensed and reference to unimportant details omitted.

No discussion is attempted in this connection of the author's recommendations as to the diet for invalids and for persons in health under various conditions because he states that the recommendations "are largely based upon my own observation" and such observations constitute original data. No intelligent discussion is possible unless the extent and character of these data are understood.

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Home University Library of Modern Knowledge. Edited by Herbert Fisher, Gilbert Murray, J. Arthur Thomson and William T. Brewster. New York, Henry Holt & Company.

The Cambridge Manuals of Science and Literature. Edited by P. Giles and A. C. Seward. New York, G. P. Putnam's Sons.

An anecdote which greatly impressed my boyish imagination some thirty-five years ago related to certain little scientific primers in terra-cotta colored cloth, written by such men as Huxley, Tyndall and Lubbock, and published, I think at a shilling, by Macmillan. The story was that some one had remonstrated with Macmillan for getting such eminent men to prepare these simple little works, when "any schoolmaster could have written them." The publisher replied that his experience had shown him that it took just such men to write good primers; that it was one of the most difficult things to accurately and effectively present the gist of any scientific subject, and attempts to have such work done cheaply by inferior men had always given more or less unsatisfactory results. Since that time multitudes of elementary scientific works have appeared, and the opinions attributed in the story to Macmillan have not been shared by all their publishers. We could hardly say, at the present time, that excellent works may not be written by men of small scientific reputation; but it assuredly remains true that they must be written by men of good training and ability. The abounding faults of our current text-books bear witness to the reprehensible lightness of heart and mind with which, in a commercial age, the teaching profession attempts to gain money and reputation.

The two series of volumes now before us, issued from New York, but prepared and originally published in England, represent new attempts to carry out the Macmillan plan. Essentially products of the universities, they are part of the general scheme of "university extension" which now finds so much favor. Varying greatly in literary and perhaps scientific merit, they maintain on the whole a high standard; and in nearly every case it may be said that the author is an eminent representative of the branch of science he discusses. The field covered is so large that no reviewer can critically consider more than a small minority of the volumes, yet in a sense he can judge best the ones on unfamiliar sub-

jects, testing by his own experience their power to interest and instruct. Tried in this way, I have found many of these little books quite inspiring, and have learned much from them.

The Home University Library volumes are larger and more pretentious, averaging about 250 pages, but selling at the very moderate price of 56 cents, post free. The Cambridge Manuals, with about 150 pages, sell for 40 cents net. The general appearance of the Home University volumes is very good, but I do not like the "rose-colored art cloth" of the Cambridge books, while the cover design, reproduced from a wood-cut of the year 1581, is ugly if historically interesting. The Cambridge Manuals usually deal with more specific or limited topics than the other books, and consequently are often more detailed or concrete. From the standpoint of a student this seems to be an advantage. The volumes are too numerous to be separately reviewed in detail, but a few notes on some of them may be useful.

Home University Library

Matter and Energy. By F. SODDY.

Very interesting and useful to one who is not a physicist. It is worth while to quote a few stimulating paragraphs:

> Our most fundamental conceptions are, like ourselves, material. The elaboration of them is easy, but their simplification to suit the immaterial world, whither we now wish to embark, is difficult almost to impossibility. If our minds habitually thought in terms of electricity and magnetism instead of in terms of matter and motion, what a world would be opened up! (p. 165).
>
> Modern science, however, and its synonym, modern civilization, create nothing, except knowledge. After a hand-to-mouth period of existence, it has come in for and has learned how to *spend* an inheritance it can never hope to restore. The utmost it can aspire to do is to become the Chancellor of Nature's Exchequer, and to control for its own ends the immense reserves of energy which are at present in keeping for great cosmical schemes (p. 247).

We may not be inclined to take all this quite literally; thus, civilization is not really synonymous with science, even in its modern developments; but it is all very interesting and productive of thought.

The Making of the Earth. By J. W. GREGORY.

Parts of this seem rather uncritically written. We are astonished to read (p. 127) "the evidence, therefore, of the distribution of animals and plants proves the former existence of continents that have been dismembered and of land routes that have foundered beneath the oceans"; and there is actually a full-page map showing the distribution of the Acræidæ, a tropical family of butterflies, as part of the important evidence of land routes across the present oceans! On p. 244 it is stated that the first traces of vertebrates are Silurian, whereas it is generally considered that America yields Ordovician fish remains.

Anthropology. By R. R. MARETT.

Written in a breezy style, with due regard to the idea that "the 'dry bones' of history, its statistical averages, and so on, are all very well in their way; but they correspond to the superficial truth that history repeats itself, rather than to the deeper truth that history is an evolution. Anthropology, then, should not disdain what might be termed the method of the historical novel. To study the plot without studying the characters will never make sense of the drama of human life" (p. 242). On p. 40 it is implied that the antiquity of the Calaveras skull is still a matter of opinion. Here and there, the flow of rhetoric appears to lead to some looseness of statement, as when it is said that Wallace discovered the law of natural selection "at the same moment" as Darwin, instead of independently, as it should have been.

Man. A History of the Human Body. By ARTHUR KEITH.

Very interesting, with a good deal of information which will be new to the average biologist; some of it in fact based on new work by the author. We may perhaps object to the account (p. 171) of *Pithecanthropus* as "the fossil man of Java," without any expression of doubt regarding its humanity.

On p. 237 bacteria are called "fauna." Comparing the very different styles of the books on Anthropology and Man, I think it must be admitted that that of the latter is preferable.

A few others of special interest must be mentioned:

Psychology. By William McDougall.

The Principles of Physiology. By John Gray McKendrick.

Electricity. By Gisbert Kapp.

The Cambridge Manuals

Links with the Past in the Plant World. By A. C. Seward.

An admirable introduction to paleobotany, by one of the greatest authorities on that subject. As a frontispiece we have a picture of *Sequoia magnifica* in the Yellowstone National Park. A particular merit of this book is its treatment of living and extinct plants together, showing how they throw light on one another; it is especially to be commended to those botanists who think themselves excused from any consideration of fossils.

Primitive Animals. By Geoffrey Smith.

A most instructive treatment of the primitive members of various phyla. Used as a text-book, it might be made the basis of a very interesting introductory course in zoology. On p. 41, the account of the distribution of *Peripatus* is incomplete, and inaccurate in the statement that the animals do not occur in the northern hemisphere. It is also no longer permissible to speak of "a small number of closely related species," in view of such works as Bouvier's Monograph. The classification of animals at the end of the book is modernized, but the "Myriapoda" are left to include both centipedes and millipedes.

The Individual in the Animal Kingdom. By Julian S. Huxley.

An essay in zoological philosophy, or philosophical zoology, influenced, as stated in the preface, by Bergson. Well-known facts are brought forward to show how difficult it is to define an "individual," and it is finally concluded that individuality is a tendency which may be manifested in varying degrees. Consequently the author makes the term cover cases in which he sees this tendency, although most of us, simply as a matter of nomenclature, will hesitate to follow him.

> The communities of ants and bees are undoubted individuals. . . . When we come to man, this power possessed by one unit of entering into more than one individual "at once" becomes very marked. A man can very well be at one time a member of a family, a race, a club, a nation, a literary society, a church and an empire. . . . It yet remains true that the state or society at large is still a very low type of individual: the wastage and friction of its working are only too prominently before our eyes (pp. 142–143).

Earthworms and their Allies. By Frank E. Beddard.

This deals principally with the geographical distribution of earthworms, but also contains a good account of their structure. The author is of course a well-known authority both on earthworms and distribution in general. I found the work very interesting, but I fear many will be repelled by the multitude of names of genera and species.

Prehistoric Man. By W. L. H. Duckworth.

An up-to-date account of what is known about early man—yet of course not *quite* up to date, as it was printed before the recent discovery in Sussex. So far as I can judge, it seems to be admirably done, and one is really astonished at the mass of information gathered in recent years. All the really important contributions have been from the old world, and "it is important to notice that time after time the attempts made to demonstrate the early origin of Man in the American continent have resulted in failure, which in some instances has been regrettably ignominious" (p. 55).

Other interesting volumes are:

Spiders. By Cecil Warburton.

Life in the Sea. By James Johnstone.

House Flies, and how they Spread Disease. By C. G. Hewitt.

The Migration of Birds. By T. A. Coward.

The Work of Rain and Rivers. By T. G. Bonney.

The Natural History of Clay. By ALFRED B. SEARLE.

The Origin of Earthquakes. By CHARLES DAVISON.

Rocks and their Origins. By GRENVILLE A. J. COLE.

The Modern Locomotive. By C. EDGAR ALLEN.

Considering that high general level of excellence, together with the very moderate prices, it would seem that almost any public library or large high school would do well to obtain both series. The treatment, usually different from that of the conventional text-book, is likely to interest many readers, some in one subject, some in another. There is not as much duplication in the two series as some of the titles might suggest; thus "Anthropology" and "Man" in the one do not at all take the place of "Prehistoric Man" in the other.

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On the Foundation and Technic of Arithmetic. By GEORGE BRUCE HALSTED. Chicago, The Open Court Publishing Company. 1912. Pp. 133.

The main purpose of this book is to place the number concept of modern mathematics within easy reach of the teacher in the grades. That there is reason for the existence of such a text is apparent from the fact that people in general and to some extent even teachers of arithmetic still look upon mathematics as "the science of quantity." The primitive number concept of modern mathematics has nothing to do with quantity. Mathematical research on this subject has been slow in commanding the attention of non-mathematicians. It is not very many years ago that a prominent American psychologist published a book in which the simple act of "counting" was declared to be an act of "measuring." It is not very long since, that a series of arithmetics was published in which the primitive idea of number was presented as being that of "ratio." Dr. Halsted brings out clearly and strongly the fact that primitive number, whether considered from the standpoint of its modern logical exposition, or from its historic development, is wholly divorced from measurement, and that number viewed as a ratio presupposes counting and is a more involved concept. The book under review contains an able presentation of fundamental concepts. This every one familiar with Dr. Halsted's earlier works had reason to expect.

The leading topics discussed in the book are as follows: The genesis of number, counting, genesis of our number notation, addition, multiplication, subtraction, division, decimals, fractions, measurement, mensuration, order, ordered sets, ordinal number, the psychology of reading a number, arithmetic as a formal calculus, suggestions on the teaching of arithmetic.

Halsted makes the interesting observation that, besides the "ordinal number" and "cardinal number," modern civilization has introduced "nominal number" used as a proper noun, as in the telephone service. "Since the size of the number and its place in the number series are here alike irrelevant, the whole stress falls upon its recognition as a unique name."

The text contains numerous historical statements, some of which are open to criticism as not embodying the latest researches. Moreover, there is a frequent lack of bibliographical reference to authorities. Thus Halsted gives $\pi = 3.14+$ and $\pi = 3.1416-$ and then adds:

> This is historically the first meaning of the signs + and —, which arose from the marks chalked on chests of goods in German warehouses, to denote excess or defect from some standard weight.

In view of the fact that historians have been in doubt as to the exact origin of + and —, the authority for Halsted's categorical statement would be interesting. Cantor[1] and Tropfke[2] both express themselves with great reserve on the validity of the explanation endorsed by Halsted. Eneström in a later re-

[1] Cantor, "Geschichte der Mathematik," Vol. II. (2), 1900, pp. 230, 231, 320.

[2] J. Tropfke, "Geschichte der Elementar-Mathematik," Vol. I., 1902, p. 134.