

only in the five-lines field that Dr. Flint here allows him, would, one must think, find his garner too empty to satisfy the pillaging of the College examiner. And one sincerely hopes he would. On the other hand, upon the very next page, the significance of the so-called vibration of voluntary muscular contraction is treated in a thoroughly satisfactory way, and in view of extremely recent experiments

One might have expected, in a text-book of human physiology, to find some description of experiments in hypnotism, or at least some mention of the matter. It is a subject that more and more demands attention from the physiologist and from the physician, and a subject to which the student of medicine can have no better introduction than from the objective, non-metaphysical side from which the physiologist makes his inquiries. One has failed to discover any reference to the subject in this work.

A few instances of curious, and one may say unjust, omission of certain authorities demand mention in a notice of the book. On p. 53 it is related that following ligation of the coronary arteries the heart ceased to beat after a mean interval of twenty-three and a half minutes in six experiments by Erichsen. One would have thought the laborious and all-important research on this subject by Cohnheim and his pupil, Von Schulthen-Rechberg, not to speak of previous work by Panum, and by Samuelson, and Von Bezold, was at least worthy of some comment in the connection, and the more so that the results obtained were so infinitely more significant and valuable than those of the experiments here quoted by Dr. Flint. In describing the endings of nerve-fibres in the fibres of striated muscle, Doyère and Rouget are mentioned, and very properly so; but the name of Kühne does not appear, and nothing is said of the nucleated "sole." The description, too, is illustrated by two figures from Rouget, more than a quarter of a century old. On p. 262 occurs the following:—"It is possible, however, that future researches may show that micro-organisms play an important part in actual digestion, as is foreshadowed in a recent article by Pasteur (August 1887). Pasteur has isolated seventeen different micro-organisms of the mouth. Some of these dissolved albumen, gluten, and caseine, and some transformed starch into glucose." "These observations are very suggestive, and they seem to open a new field of inquiry as regards certain of the processes of digestion." To most readers, these lines would certainly infer that observations of this kind had first been recognized in their full bearing by Pasteur, or that, indeed, the observations of Pasteur were the earliest or the most important of the kind. To do this is to do signal injustice to a large number of investigators, who, possessed of the idea, have obtained experimental evidence of its truth, much more complete than, and several years in advance of, that published by Pasteur. One need only mention the names of Duclaux, Marcano, Hueppe, Miller, Wortmann, Escherich, Bourquelot, Brieger, Wolff; and there are many others.

A minor point on which one is inclined to join issue with Dr. Flint is the terminology he employs. He does not employ the word metabolism, but the notion is expressed by employment of "assimilation," and "disassimilation." The latter has a peculiarly uncouth ring. The words "anabolism" and "katabolism" one does

not find. To speak of serum albumin as serine; of paraglobulin as metalbumen, and of this last as "dissolved fibrin" is likely to render more confused subjects that are sufficiently so already. It is not usual to spell the name lecithin indiscriminately lecithene and lecethine. Gustation and olfaction are not pretty words.

In the matter of illustrations the volume is thoroughly and artistically equipped. Fig. 64 and one or two more of the same kind are, however, severe blemishes. How, one asks, can the drawing of a dog with a fistulous wound in the body benefit the student? What good purpose can it subserve? The figure is a useless, gratuitous exhibition of what must to every mind be the unfortunate and repulsive accompaniment of physiological research. Intellectual and material boons conferred upon society justify to the full a pursuit of the science in despite of every difficulty of this kind, because those boons can be obtained for it by no other course of action. They do not, however, justify for such a book as Dr. Flint's one single picture such as those referred to.

As was to be expected, the question of the elimination of nitrogen from the body is treated with that pleasant decision and competence that can be assumed only by an author who has himself carried on research in the field of which he is writing. The observations of Dr. Flint upon Weston the pedestrian are seemingly at variance, as he remarks, with those of Parkes, and of Fick and Wislicenus, made upon other persons. The suggestion is valuable that the difference may be explained by the much more strenuous character of the exertion undergone by Weston than by Parkes's soldiers, or by the physiologists who walked up the Faulhorn. Dr. Flint found that the excretion of urea was increased by a walk of 100 kilometres a day for five consecutive days, the walker being upon the same generous diet during as well as before and after the exertion. Fick and Wislicenus during their ascent and for a short time beforehand abstained from all nitrogenous food. They found an actual decrease in the amount of urea excreted in the period of exertion. But in the main result the researches are in accord. They all alike fail to yield evidence of increased degradation of proteids sufficient to account for the increased quantity of energy set free.

In conclusion one has to add one word in praise of the form and typography of the book. It is evident that, as the author says in his preface, "the publishers have spared nothing in the mechanical execution of the work." C. S. S.

GEOGRAPHY IN GERMANY.

Beiträge zur Geophysik: Abhandlungen aus dem geographischen Seminar der Universität Strassburg. Herausgegeben von Prof. Dr. Georg Gerland. I. Band. (Stuttgart: Koch, 1887.)
Bericht über die Entwicklung der Methodik und des Studiums der Erdkunde. Von Prof. Dr. Hermann Wagner. Im *Geographisches Jahrbuch*, 1888. (Gotha: Perthes.)

IN 1886-87 there was much discussion among English geographers about the limits and methods of their subject. The whole matter had been gone into by the Germans a few years before. It is curious to note that

just when we had relapsed into something like silence on the point, and had agreed to put our views to the test of practice, the debate was vigorously revived in the Fatherland. In part this was the effect of the sympathy and of the supply of material for criticism which came across the water, but in the main it was due to Dr. Gerland's striking introduction to the first volume of the Strassburg "Contributions to Geophysics." In the last *Geographisches Jahrbuch* Dr. Wagner sums up both the English and the German discussions, and, though he differs radically from Dr. Gerland's fundamental positions, he gives to his essay the place of honour. The clearness and richness of its style, the closeness of its argument, the extreme and unhesitating views it enunciates, and its author's great experience command attention, and must be the excuse for once more bringing an almost threadbare subject before English readers.

The three propositions which Dr. Gerland aims chiefly at establishing are that geography has to deal not merely with the earth's surface, or even the earth's crust, but with the earth as a whole; that the human element should be shut out entirely from the view of the geographer, and that geography must be a single science characterized by a single method of investigation, the "mathematical-physical" to the exclusion of the "biological-historical." He defines the task of geography as the study of the "interaction between the earth's interior and the earth's surface," of the "interaction of the forces connected with the earth's matter, and the arranging and rearranging—the development—of the earth's matter as a result of these forces;" in a word of "the earth as a whole," the surface being but the expression of the interior. He enumerates five "geographical disciplines"—mathematical geography, geophysics, *Länderkunde*, geography of organisms, history of geography—and of these geophysics is the most important. He regards mathematics, physics, and geology, as the sciences auxiliary to geography, but mathematics as the least dispensable. He agrees with the views expressed in England in 1837, in laying down the difference between geology and geography as consisting not in the objects studied, which are to a certain extent the same, but in the point of view from which they are studied. After comparing the definitions and programmes of geology according to Naumann, Lapparent, Lyell, and Credner, he terms geography the science of the forces of the earth as a whole (*Kräfte der Gesammterde*); geology, that of the structure of the earth's crust (*Structur der Erdrinde*). It should be noted that his *Länderkunde* is purely physical, the "special part of geophysics"; and that his geography of organisms refuses to touch the organism man. He excludes the human element, or, to use Ratzel's term, *Anthropogeographie*, from geography, on the grounds that, while geography is a science auxiliary to history, the converse is not true; that geography would have two methods—the "mathematical-physical-exact" and the "biological-historical-conclusive"; that mastery of the two methods exceeds the power of one man, and that, as an educational discipline, geography loses force and logical cohesion owing to the mixture of the two methods. He assigns anthropogeography to the historian, whose point of view is that of the microcosm, man.

Dr. Gerland claims for geography, as defined by him,

that it is a single science, dealing with a homogeneous mass of facts, with one method and a logical unity, making it a true field for the investigator, and of value to the teacher. His essay of fifty-four pages contains a wealth of examples and of neat formulæ which compel admiration; but it is questionable whether he does much good with his chief positions. With Dr. Wagner, we are disposed to think that he exaggerates the importance of his point that the earth *as a whole* is the subject of geography. He keenly combats the view that the surface of the earth, the topographical, is the specific characteristic of geography. Yet surely the burden of what has been recently said, on the part even of those who hold this view, has been that you must not stop short at the defining of relative position, but inquire into causes, and those causes lie largely within the earth. But Dr. Gerland's second position, his uncompromising exclusion of the human element, has more substance. Bold though he is, he has not dared to exclude the geography of (non-human) organisms. Does not his inconsistency here invalidate his programme? All through his essay one fancies there is a certain undertone of contempt for the merely probable results of anthropogeography. But are the results of the investigation of the distribution of animals at best more than highly probable? Are they not attained by the biological-historical-conclusive method? Are they capable of mathematical expression or certainty? Again, is it fatal to geography that it is too much for one man? Is any man equally master of all the methods of any science? Dr. Gerland is hardly fair to anthropogeography. He says, "river and town are heterogeneous conceptions which geography can never bind logically together." Surely a river may be viewed under two aspects—physical and human. It is part of a great circulation beginning and ending in the ocean, and it is an obstacle or an advantage, according to circumstances, to human communication. Lines of human communication and points of human settlement are not heterogeneous conceptions.

But the real seriousness of Dr. Gerland's contention lies in its results in education; indeed here only is it important. You cannot hedge in the original investigator; you cannot forbid him to cultivate the march-lands which sever the different fields of knowledge. You are only entitled to define what you expect of a geographical teacher and text-book. To exclude the human element would be fatal to the early or general learning of geography. None but mathematical specialists have the preliminary knowledge needed for Dr. Gerland's geography. It would be equally bad to have two geographies, one for the schoolmaster, another for the professor, for it is just because the Universities have neglected this subject that the school teaching has been so ineffectual. Logically, mathematical geography should no doubt come first, but a teacher rarely does well to begin his teaching with the first principles of his subject. H. J. MACKINDER.

OUR BOOK SHELF.

Gleanings from Japan. By W. G. Dickson. (Edinburgh and London: W. Blackwood and Sons, 1889.)

AFTER an interval of twenty years, Mr. Dickson revisited Japan in 1883-84, and in the present volume he gives an account of what he saw. The book contains no very novel