if necessary, and the work should be delayed no longer. The development of our waterways and the conservation of our forests are the two most pressing physical needs of the country. They are interdependent, and they should be met vigorously, together and at once. The questions of organization, powers and appropriations are now before the congress. There is urgent need for prompt and decisive action.

THEODORE ROOSEVELT

SCIENTIFIC BOOKS

Darwinism To-day. A discussion of present-day scientific criticism of the Darwinian selection theories, together with a brief account of the principal other proposed auxiliary and alternative theories of Species-Forming. By VERNON L. KELLOGG. New York, Henry Holt and Co. 1907. Pp. 403.

Undoubtedly the best book of its kind, and cordially to be recommended to the student or layman who struggles with the fluctuations of evolutional belief. This commendation, however, will not seem extreme when it is pointed out that this is practically the only book of its class! For few indeed are the authors who have attempted the herculean task of sifting out the vast literature which has accumulated around the problems of evolution during the past two decades. The present book then is one which fills a decided need. It is brief, clear and contains summaries of general and technical interest which are elsewhere not to be obtained in the English language. Indeed nowhere else will one find attractive digests even of the classical work of Roux, Naegeli and Weismann. The nearest approach to it is Plate's "Über die Bedeutung des Darwin'schen Selectionsprincips," of which a translation has never been published. And to this work Professor Kellogg acknowledges frankly his great indebtedness.

Particularly to be commended in the present book is its style. It breathes of the open air, and leads one, oftener than usual in these days, away from the click of the microtome. The main text of the book is interesting, its illustrations—there are no pictures, by the way—are chosen discreetly, and technical summaries and discussions are usually tucked away in the form of appendices.

The author has brought together the objections to old-fashioned natural selection (which have become a lengthy part of post-Darwinian writings) with a fair degree of completeness. Such objections, off-hand, are these: that natural selection makes for constancy not variability; that it produces changes quantitative not qualitative; that it can operate only on great averages, not on individuals; that it does not account for continued degeneration; that small variations give no "handle" for selection; that sexual selection is impotent; that it explains the survival not the arrival of new variations; that the struggle for survival of one set of characters leaves the others to fall effetely to panmixia; that great variations are apt to be eliminated by panmixia; that plural variations are necessary to insure the origin of species; that correlated variations are excessively difficult to explain; that there is weakness in the evidence as to the elimination of the unfit. And these objections are threshed out in adequate detail.

On the other hand, the author considers, but rather incompletely, the replies of the neo-Darwinians to their critics. He examines, for example, the question of the rise of qualitative differences by correlation; the importance of the principle of change of function, and the demonstrable value of small fluctuating variations in certain cases.

In a book of this kind the critical reader is always interested in determining the point of view of the author himself, and in this regard Professor Kellogg is entitled to hold views by virtue of his own valuable studies on matters evolutional. Professor Kellogg, it appears, feels keenly the criticism directed against the Darwinian factor and pronounces early in his work that "each naturalist for himself must decide how vigorous is selection." Withal, however, he realizes the particular lack of and weakness in substitutional explanations. His

own view of the origin of species is, we gather, a peculiarly composite one; in many regards it resembles Plate's, and is a compound of Darwinism, orthogenesis, mutation (mildly emphasized), Lamarckian use-inheritance, and the "unknown factors." It is clear that he attaches less importance than Plate to the Darwinian factor. Thus he believes that Plate's "passive adaptations" may be explained by other means than by natural selection, and in this regard he derives help from the views of Roux to explain mechanically the initiation of delicate inner adaptations. So, also, it appears, he looks upon organic selection as not strictly neo-Darwinian, for, he argues, if ontogeny can constantly bring into the organism a beneficial structure (as in orthogenesis), what need is there for the selection of minute beneficial variations? On the other hand, he does not sympathize in any sense of the word with teleologicians: and in this regard he stands sharply cut off from several recent writers, for we can not deny that these reactionaries are gathering strength. In explaining "purposive" adaptations he sides rather with Plate, but attributes little value to amphimixis, and he has little leaning to germinal selection. To the various micromeric theories, as well, his attitude is non-sympathetic. To the influence of isolation he gives considerable space and takes a middle ground in estimating its importance. With many critics of selection he agrees that too much prominence in the problem of the origin of species has been given to artificial selection. At the same time he is a convert to the causo-mechanical conception of orthogenesis, which he calls "one of the most important matters connected with the whole great problem of descent," one which deals with the "basic problem," for it touches "the problem of beginnings." He does not indicate, however, to what degree this form of evolution can be regulated, and in this regard is unlike Weismann, who seeks to construct a mechanism, which corrects automatically too extreme a type of orthogenesis.

Kellogg's own conception of evolutionary processes, then, is extremely complicated: and we have not yet included in it the "unknown factors." This article in his faith he declares more emphatically, I think, as he progresses in the book. But it is clear that he does not consider these unknown factors as in any sense vitalistic: he thinks unnecessary a "mysterious tendency of the germ plasm to vary," and, nearing an ultimate problem, suggests that the "inevitable non-identity of vital process and environmental conditions may alone be enough to supply the automatic modifying principle, antedating and preceding selection, which must affect change determinate, though not purposeful. Naegeli's automatic perfecting principle is an impossibility to the thorough-going evolutionist seeking for a causo-mechanical explanation of change, but an automatic modifying principle which results in determinative or purposive change . . . is not that the very thing provided by the simple physical or mechanical impossibility of perfect identity between process and environment in the case of one individual and process in environment in the case of any other?" But this conception of Kellogg is, so far as we can see, little more than the restatement of the idea of environment and variability which has been woven into the warp of discussion ever since evolution has been seriously considered.

In a work of this kind, one should be grateful for its utility and its general accuracy, and not go far out of the way to dig into its structural details. Without wishing to be unduly critical, one might nevertheless point out that in this *Darwinism to-day* there is no reference to many and notable discussions of the last half dozen years, some of which, by the way, were published in the pages of this journal. Nor is the neo-vitalistic side of evolutional philosophy given due consideration—not, be it understood, that the reviewer is in keen sympathy with this point of view. Nor is the more wholesome neo-Lamarckian philosophy expounded adequately. In such a work, there should have been some reference to Pauly's "Darwinismus and Lamarckismus" (1905), and some citation to the Lamarckian utterances of so distinguished a biologist as Professor Boveri (in his address (1906) as

Rector of the University of Würzburg). One does not leave out of sight in commenting on these omissions the fact that the present book aims to be popular, not encyclopedic. Furthermore: There is scanty reference to recent Mendelian work. And there is altogether too brief notice of the evolutional work of paleontologists: the extraordinary studies of Hyatt are inadequately referred to and there is no mention at all of his pupils, Jackson and Grabau. And while Jaekel's epistasis is summarized, there is no reference to the kindred and earlier neotænia of Boas. In the treatment of the environmental factor there is similar unevenness: for while there is given an excellent and detailed account of Wagner's speculations, there is scanty mention of the distinguished services of Professor J. A. Allen, and his name, by the way, does not occur in the index—but this proves nothing, for the index is sadly defective. In general, however, from the point of view of book-making, one does not find serious defects. Printers' slips are not numerous, but one can find them, if he looks hostilely, as he can in any other book. Thus Perameles—even in these days when ill-spelling commends itself to taxonomists—would hardly recognize itself as Permales on page 280. And here and there careless or inaccurate expressions have not been eliminated in the proof. Thus, it is stated that the lung sacs of birds penetrate "through hair fine holes into all the bones," and that in "many fishes the female may never even see the male at spawning time."

BASHFORD DEAN

An Introduction to Vegetable Physiology. By J. REYNOLDS GREEN. Second edition. Pp. xx + 459, 182 figs. in text. Philadelphia, P. Blakiston's Son & Co. $3.00.

The first edition has been favorably known for a number of years and the publication of a second edition aroused the expectations that it might be further improved and brought up to date. However, in the volume before us we find little change from the original imprint. It is indeed to be regarded more as an American reprint than as a second edition in the proper sense of the word. It is noticeable that there is no new preface and that the one printed is word for word the same as the first edition with the exception that the date has been omitted. In fact, throughout the book the plates are almost identical, if not wholly so. The one important difference is that Chapter VIII. of the first edition, entitled "Respiration," has been shifted and amalgamated with Chapter XIX. which deals with the release of energy, the two together constituting Chapter XVIII. of the new edition under the title "Energy of the Plant." This is undoubtedly an improvement and renders the presentation of the nutrition phenomena, already well treated, much more logical and comprehensible. Some smaller changes are to be noted in the alteration of introductory paragraphs to certain chapters and the substitution of the more modern word protein for the older term proteid.

Despite the fact that so little new material has been added, it remains one of the best shorter reading books in physiology that we have in English, particularly in the matter of nutrition physiology, which is treated very much more fully than the growth phenomena. It is perhaps to be regretted that more was not done to amplify the second edition, but if its publication in this country will serve to bring it more to the attention of students here, it will serve a useful purpose.

HERBERT M. RICHARDS

SOCIETIES AND ACADEMIES

THE CHICAGO ACADEMY OF SCIENCES

THE Chicago Academy of Sciences held its annual meeting on Tuesday evening, January 14, 1908, at the academy's building in Lincoln Park. The report of the secretary showed that the work of the academy had been pushed steadily forward during the year and that much had been accomplished in promoting educational matters of a scientific nature among the schools and citizens of Chicago.

Monthly meetings and Friday evening popular lectures have been maintained by the academy, in addition to a number of lectures by other societies, under the auspices of the academy. The most notable of these lectures