more curved. Condylobasal length of skull about 160 mm.

Affinities.—Last and largest known representative of a line of robust paramyines represented by *Pseudotomus* in the middle Eocene and *Ischyrotomus* in the later Eocene. Relationship to *Paramys, sensu stricto,* less close and probably through an early Eocene common ancestry as yet undefined. Related in a broader way to the ischyromyids in general, but not close to any other known Oligocene genus.

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THE VELOCITY OF LIGHT

THE note concerning "The Speed of Light," printed in *Science News* in the issue of SCIENCE for April 4 on page 10, calls attention to recent work by Dr. Wilmer C. Anderson.

The "group velocity" correction factor of Dr. Anderson, at its quoted value of 6.92 km, is only about 0.00231 of one per cent. of the speed which he finds (299,776 km/sec). The drop from the Michelson value of 1926 is 20 km, or about 0.00667 of one per cent.

Moreover, the table of values given in SCIENCE for 1927, September 30, shows a continuous fall in values from 1849 to date, except for the 1855 value. The total fall in values from the 1849 value to that of Dr. Anderson is *4.32 per cent.* Why always downward? Is it possible that all the errors of measurement were on the same side of the true value? This seems improbable.

Though I like to believe that the speed of light is constant, further measurements will be followed with much interest.

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SCIENTIFIC BOOKS

BIOLOGICAL OXIDATIONS

Mechanisms of Biological Oxidations. By DAVID E. GREEN. 181 pages, bound. Cambridge University Press. 1940. $2.75.

THE announcement of a monograph on "Biological Oxidations" by D. E. Green evoked high hopes and expectations. These were in part founded on the belief that the author, by virtue of his American upbringing and training and his subsequent extensive scientific activity in England, was predestined to achieve a well-balanced synthesis of the subject-matter, drawing equally on the contributions made on both sides of the Atlantic. His competence to do this job well was assured not only by his own creditable experimental contributions but even more so by his previously demonstrated gift to present difficult problems in a lucid manner. Furthermore, a book suited for the beginner and dealing with the present status of the field in a moderate space was in definite demand, since it was to fill the gap between such excellent but necessarily limited review articles as that by E. S. G. Barron (*Physiological Review,* 19: 184, 1939) and the more comprehensive and greatly detailed treatments, as that in Oppenheimer's Supplement to his hand-book on "Enzymes."

A careful study of the book leads to the conclusion that it is definitely useful; useful in the sense that it may be recommended to students and teachers alike as a guide into the labyrinth of tricks by which nature contrives to make the rather inert and sluggish oxygen gas "combust," at body temperature and in a neutral medium, substances like succinic acid which the chemist must overwhelm by boiling them with chromic acid. It is an achievement to cram 178 pages full with experimental facts and detailed information and to end up with a thoroughly readable treatise which avoids successfully overtaxing the average reader's capacity for assimilating the material and which keeps his interest alive to the last page. The comments which follow are offered in a spirit of constructive criticism and are not meant to detract from the intrinsic value of the book.

To begin with the title of the book, it might perhaps read more appropriately, "On the preparation and properties of oxidative enzymes; with an appendix on organized systems." Of a total of 178 pages text, 163 are taken up by introductory remarks on general properties of oxidative enzymes and by subsequent, well-organized chapters on iron porphyrin protein, pyridinoprotein, flavoprotein, copper (and zinc) protein and thiaminoprotein enzymes, cytochrome-reducing dehydrogenases and unclassified oxidative enzymes. It is doubtful whether the inclusion of preparative details in a monograph of this size is beneficial, since a worker interested in the isolation of a given enzyme will probably want to consult the original publication anyway. Space thus saved might have been devoted profitably to an expansion of the last chapter dealing with reactions in organized and integrated systems. This does not necessarily mean that cellular respiration and intermediary metabolism are regarded as integral parts of the topic of biological oxidation. These subjects are, perhaps, more within the realm of physiology and physiological chemistry in general. But phenomena like those observed in reconstructed systems

where several enzymes, coenzymes and substrates cooperate, *e.g.*, carrier-linked reactions which the author has so successfully explored, the study of the function of enzymatic and non-enzymatic catalysts within the living cell, catalytic cycles involving metabolites and other intermediates, would have deserved a fuller discussion. Certain fundamentally important topics such as the relationship between oxidation-reduction potentials and the line-up of oxidative catalysts in cellular respiration or the rôle of semiquinoid and other radicals in oxidative catalyses are barely touched upon.

The center of gravity of the book is situated in Cambridge, England, on the south side of Downing Street, about midway between the Dunn Institute of Biochemistry and the Molteno Institute of Parasitology, where the laboratories of Sir F. Gowland Hopkins and M. Dixon and of D. Keilin, respectively, are located. While this is a tribute to the loyalty of the author whose development was so decisively influenced by these men to whom the volume is dedicated, and while some of the members of other "galaxies" revolving around this center also find mention in the exposition, there are some glaring omissions, often concerning work performed on this side of the Atlantic.

No one who has followed the rapid metamorphosis of the author from a keen, but little experienced student to a mature investigator and a recognized authority in the field, can fail to be impressed by his detached and cautious attitude towards many controversial questions. In fact, this reserve might be mistaken by some for indifference and artificial neutrality. After all, the individual facts are on record and could, although with considerable labor, be dug out from the literature. But the chief interest in such a book, at least to the fellow workers of the author, is to find out what *he* thinks of the burning issues in the field.

A few points deserve specific mention. In Table I (p. 12) one misses the inclusion of pheoporphyrin among the porphyrins important for the discussion of iron porphyrin protein enzymes; nor is the pheohemin nature of the respiratory ferment of Warburg mentioned. It is interesting to note that the author considers the identification of Warburg's ferment with the cytochrome a_3-component of Keilin as premature. In presenting Keilin's scheme of catalase action, based on a specific reduction of the ferric form by hydrogen peroxide and a reoxidation of the ferrous form by molecular oxygen, the objections raised by other workers are not discussed. The enzyme-substrate compound character of the spectroscopically well-defined catalase-ethyl hydrogen peroxide complex is denied in a rather categorical fashion without adducing convincing evidence. In the section on peroxidase, the early formulation of Willstaetter and Heiss for the conversion of pyrogallol to purpurogallin is reproduced without referring to the more recent scheme proposed by Haber and Willstaetter which postulates the intermediary production of monovalent radicals and which assumes a chain character for the process. It is stated that peroxidase is best prepared by the combined methods of Elliott and of Keilin and Elliott, representing extensions of Willstaetter's original methods and yielding preparations of a maximum activity, expressed in terms of the purpurogallin number, of P. Z. 1500; whereas Willstaetter and Pollinger, many years before, succeeded in obtaining preparations of P. Z. as high as 4900. Furthermore, it ought to be mentioned that proof for the exact position of the side chains in the peroxidase hemin is still lacking.

In the section dealing with cytochrome components and cytochrome oxidase, the work by Zeile and his collaborators and that by Theorell on the chemical structure of cytochrome c might have deserved a fuller discussion. The intimate association of cytochrome oxidase with "insoluble particles" is stressed, whereas recent work (*cf.* Cold Spring Harbor Symposia, 7: 312, 1939) suggests an alternate interpretation. The work by Stotz, Hastings and Hogness on cytochrome oxidase is not mentioned. The statement that the intensities of the cytochrome a and a_3 bands always run parallel, is in error (*cf. Ann. Rev. Biochem.*, 9: 1, 1940).

In the chapter discussing pyridinoproteins, a structural formula for coenzyme II (triphosphopyridinenucleotide) is given, postulating a bridge formed of three phosphoric acid radicals in a straight line, which has become rather improbable in view of the ready interconversion of coenzyme II into I (diphosphopyridinenucleotide).

It might be mentioned, in passing, that the exclusive crediting of the Kuhn and Karrer schools for elucidating the structure of riboflavin and of Tauber for first synthesizing cocarboxylase is in conflict with the facts (*cf.* Theorell, *Bio. Z.*, 278: 263, 1935; *Erg. Enzymforschg.* 6: 111, 1937, with regard to the former and *Enzymologia,* 3: 82, 1937, with regard to the latter).

In a future edition, it is probable that the author will want to include the full discussion of ascorbic oxidase in the chapter dealing with copper proteins rather than in that on unclassified oxidation enzymes.

The very complex and controversial question of nomenclature is handled with skill and tact.

The excellent paper, binding and printing are in the best tradition of the Cambridge University Press and do not convey an inkling of the fact that the book was produced in a country fighting for its very existence.

KURT G. STERN