the hypothesis in the light of what he saw through the microscope, but the germ theory had to wait for laboratory verification at the hands of Pasteur. In connection with the theory of the transmission of disease by insects it is of interest to note that Sir Henry A. Blake, governor of Ceylon, has pointed out[3] that the mosquito theory of the origin of malaria is as ancient as the Susruta, a Sanskrit medical classic at least 1,400 years old. Quite an anthology might be compiled of references from secular literature in which swamps, mosquitoes and malaria were vaguely associated as if in causal connection before King enunciated the theory in 1882. But no one ever thought of mosquitoes in relation to yellow fever before the time of Finlay and Walter Reed.

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The Lower Tertiaries of Louisiana

To the Editor of Science: In preparing manuscript for publication on the lower Tertiaries of Louisiana it has seemed desirable to have a formational name for that portion of the Eocene usually styled in our former publications "Lower Claiborne." In accordance with the wishes of the committee on nomenclature the geographic name *St. Maurice* is here proposed for these well-known Mississippi embayment marine beds.

G. D. Harris

The Length of Service Pensions of the Carnegie Foundation

The articles by Professors Cattell and Jastrow following that of Professor Lovejoy and the *Nation* editorial, have put in such strong light the disadvantages and the injustice of the recent ruling by the Carnegie Retiring Board, that it might seem little remains to be said. There can be little doubt that these articles express the sentiment of a great majority among those who have been looking forward to a service retiring allowance upon the Carnegie Foundation. Some professors who have considered the system a great aid in securing stronger American universities, have now lost all interest in it. If a professor who entered early upon teaching must continue for forty years as a professor in order to acquire any benefits from the foundation, not much inducement is offered him.

There are, as it seems to me, two considerations not specially emphasized in the articles cited, which might well be taken up. In his report recently published, the president of the foundation lays stress upon the fact that the professors thus far retired upon the foundation because of age, all laid down their work with regret, and in some cases felt hurt that they had been induced to do so. No one familiar with university men will for a moment doubt that these statements represent the facts as regards an even larger body of the older professors. Among the middle-aged and young men of universities, and it might be added the student body, the opinion is probably as general that professors generally remain at their posts after their best work of teaching has passed. This opinion of the younger men does not spring altogether from a selfish desire to fill the positions of their seniors, since their conclusion expresses a law of human nature which is exemplified in every walk of life, but perhaps most strikingly upon the concert stage. When nowadays a young man states openly that he will retire from his post voluntarily before his powers have been impaired by age, he is perhaps cynically requested to set the statement down in writing; for, once admitted into the group of the older men, it is notorious that he acquires their point of view as naturally as liberals become transformed into conservatives after their admission to the British House of Lords.

The question of the relative teaching efficiency of professors at the different ages between forty and seventy-five years, is one to be decided by results, and it would be of special interest if the statistics recently gathered by the Carnegie Foundation from the so-called accepted institutions were compared and published. If the average age of the

[3] *Jour. Ceylon Branch Brit. Med. Assoc.*, Colombo, 1905, II., 9.

teachers in each grade of university work were made public for each of the institutions in question, the reader might then draw his own conclusions based upon the relative standings of the institutions.

Aside from personal observation, there are two reasons which make it unlikely that the best work of a teacher should extend beyond a moderate term of years. In the first place, the world moves forward so rapidly that in a period of thirty-five or forty years, methods, view-points and subject-matter of the sciences are all more or less transformed. Few of our universities provide a sabbatical year in which the opportunity is offered the professor to make himself over, even if he be constructed of sufficiently plastic materials. In the second place, few men can go year after year over the same tasks without reaching a condition which in the athlete would be designated "stale." The enthusiasm of earlier years is bound to become more or less dulled, and enthusiasm and interest are vital elements to the teacher.

There is another important function of the teacher which should be carefully brought into consideration, for an insidious encroachment has been made upon it during the past decade. I refer to research, which, it will generally be admitted, should in every possible way be encouraged in the university professor. There is no really great university that has not done its part in widening the horizon of the known through the investigations by its professors. It might be safely predicted that a university which relinquished altogether this function would speedily degenerate to an inferior rank. The spirit of inquiry and of testing conclusions is, in fact, that which differentiates higher instruction from that of lower grade. It may not be generally recognized, but it seems to be true that in respect to research the American universities are to-day in a somewhat critical position as a result of the great fortunes built up through consolidation of business interests. American research is fast becoming institutional. It will probably have to be admitted that the immediate results have been so much the more increased, even though the universities have suffered by it. The enlargement of government and state scientific bureaus, the private foundation of great laboratories in the interest of medical science, and the laboratories of practical science established in connection with the great industrial concerns, have withdrawn from the universities many of the men who have made reputations by their researches. To some of those that remain the Carnegie Institution of Washington has offered some advantages, but the avowed policy of that institution is now to centralize its work more and more in the city of Washington and in its own special laboratories.

The problem thus thrust upon the universities is one that they can not afford to ignore, since it is not always easy to convince boards of regents or trustees that a professor is filling his chair with credit when a considerable portion of his time is devoted to purely research work. The service pension of the Carnegie Foundation, while not offering a full solution of this problem, had yet made the outlook more promising. If it be true that the average professor between the ages of fifty-five and sixty-five is on the whole less efficient as a teacher than the man ten years his junior, I believe that as regards research the reverse would more nearly represent the facts. Most men who have gone far in investigation have begun with smaller problems the original study of which has suggested kindred questions, so that as they have advanced the field of their studies has constantly widened until far more general and fundamental questions have been forced upon the attention and been made the subjects of inquiry. Thus the ripe period from fifty to sixty-five years of age is with little doubt the one which under favorable conditions offers the greatest opportunities for research. A paragraph in President Pritchett's letter of April 24, 1908, shows his appreciation of the opportunities the universities would secure if professors retired upon service pensions could continue their work in research upon the grounds of the university:

> I can imagine no better thing for an institution of learning than to have about it a group of men who are engaged in active research and who are not burdened with the load of teaching which

falls to most American teachers. In this way the retiring allowance will contribute directly to research.

The abuses which, it is intimated, have led to the withdrawal of the service pension, seem to have been on the whole far less serious than has been assumed. The forcing of professors of long service to resign their positions has generally carried with it such danger to the president's own tenure of office that it has rarely been undertaken. There has been additional difficulty in that an aged professor whose efficiency had been impaired would be left without adequate financial support though fully deserving of rewards upon the basis of his earlier work. With the service pension provision withdrawn it will now be incumbent upon university presidents to retain upon their staffs all professors not physically disabled up to the age of sixty-five, no matter what may be their efficiency as teachers. It can hardly be doubted that the effect will be to lower the efficiency of teaching in the universities.

Wm. Herbert Hobbs
University of Michigan,
March 15, 1910

SCIENTIFIC BOOKS

The Oxidases and other Oxygen Catalysts concerned in Biological Oxidations. By J. H. Kastle. Hygienic Laboratory Bulletin No. 59, December, 1909.

The bulletins issued by the Hygienic Laboratory at Washington constitute a most interesting and valuable series of contributions which reflect the greatest credit upon the organization and spirit of this important department of the Public Health and Marine Hospital Service. For the most part these publications consist of experimental researches dealing with topics of timely interest to physicians and biologists in general, while some of them are of the nature of résumés of the literature and the condition of our knowledge in regard to special problems. The bulletin to which attention is called here belongs to this latter class. It contains an elaborate and thorough review of the history and present status of the difficult and complex subject of oxidations particularly as they occur in living things. Since this review is written by one who himself has been a distinguished contributor to the experimental investigation of the subject it possesses the additional value of being an authoritative presentation which other biologists may use with a feeling of confidence in its accuracy. Professor Kastle modestly disclaims any pretention to completeness as regards the literature consulted in the preparation of the bulletin, but it will be noted that four hundred and sixty-seven references are given in the appended bibliography, and those who read the contribution will be impressed with the fact that the author writes out of an unusual fullness of knowledge of the subject in its chemical as well as its biological bearings. After the discovery of oxygen by Lavoisier the history of the attempts made to disclose the nature of the processes involved in the physiological oxidations of plants and animals may be divided, according to Kastle, into three periods. The first of these deals with the bluing of guaiacum, especially by extracts of plant tissues. The names that are important in this connection are Planche, Taddei and particularly Schoenbein. The last-named observer studied the subject from many sides and arrived at a clear understanding of the fact that plants and animals contain special substances, destroyed at temperatures below that of boiling water, which have the property of combining with atmospheric oxygen and activating it so that it is capable of effecting the wonderful oxidations characteristic of living things. Schoenbein himself believed that these substances render the oxygen active by ozonizing it, but this view has not been confirmed by subsequent work. The second period is connected with the work of Traube, who was responsible for emphasizing the importance of hydrogen peroxide in all oxidations, including those of living things. His peroxide theory as developed later by Bach, Engler and others does not assume that hydrogen peroxide itself is formed in the processes of physiological oxidations, but that the organic substances which combine with the oxygen, designated