

mechanical engineering and Dr. Albin H. Beyer in civil engineering.

At Yale University, Dr. H. L. Seward and W. J. Wohlenberg have been promoted to be professors of mechanical engineering, and Dr. G. A. Batsell to be professor of biology.

At Vassar College, Associate Professor C. J. Beckwith has been promoted to professor of zoology and Ruth C. MacDuffie has been appointed instructor in zoology and anthropology. Assistant Professor H. M. Allyn has resigned to become academic dean of Mt. Holyoke College.

DR. JACOB C. GEIGER, executive secretary of the Chicago Health Department under the administration of Dr. Herman N. Bundesen, has accepted a position as professor of bacteriology at the George Hooper foundation of the University of California Medical School.

LARS G. ROMELL, of the Swedish Forestry Experiment Station at Stockholm, assumed his duties on April 1 at Cornell University as first incumbent of the Charles Lathrop Pack research professorship for the study of forest soils. Professor Romell will be associated with Professor T. L. Lyon, head of the department of agronomy and soils, and Professor Ralph Hosmer, of the forestry department. Professor Romell's appointment is for three years.

PROFESSOR J. J. R. MACLEOD, associate dean of the faculty of medicine at the University of Toronto, co-sharer of the Nobel prize in 1923 with Dr. F. G. Banting, the discoverer of insulin, will leave Canada in the autumn to become Regius professor of physiology at the University of Aberdeen, in succession to Professor J. A. MacWilliam, who recently resigned.

DISCUSSION AND CORRESPONDENCE

DEAFNESS IN PRE-COLUMBIAN PERU

THE determination of the causes of deafness in an ancient race of people, such as the pre-Columbian Peruvians, is well worth undertaking. The subject has already received some attention. Burton¹ has given an extremely useful survey of the nature of aural exostoses in general, with a brief account of otosclerosis.

The aural exostoses in the external auditory meatus in pre-Columbian crania from Peru are often definite osteomae with a typical ivory-like luster, and extremely hard and dense. These never grow very large, and I do not know that a single osteoma ever closes the auditory canal, but the presence of three tumors

does close the canal completely, on one and on both sides. In addition to this the walls of the auditory canal itself often become swollen and sclerotic and close the canal, thus producing deafness.

The assignment of strain, brought on by the mastication of tough food, as a cause of the exostosal growths, and possibly the cause also of otosclerosis in general, requires an anthropological survey for confirmation. Infections played a part in deafness, for I have seen cases of pre-Columbian middle ear infections.

Aided by a grant of \$300 from the Committee on Scientific Research, American Medical Association, a more exact investigation of the ancient conditions will be undertaken. Dr. L. C. Kinney, of San Diego, will do the roentgenological work on the pre-Columbian crania, and I have at my disposal scores of roentgenograms of unopened mummy-packs.

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PRODUCTION OF POTATO TUBER NECROSIS

IN the course of investigations, chiefly histological and cytological, carried on during 1926-27 at the University of Wisconsin, but under the auspices of the Vermont Experiment Station, experiments were conducted by the writer to throw more light on the real relationship existing between leafroll and net necrosis of the Irish potato. Through the use of cages to exclude undesirable insects, potato plants were grown in the field both from healthy and from leafroll tubers and aphids of the species, *Myzus Persicae*, were colonized on leafroll vines under cage and transferred at intervals to the foliage of healthy vines also under cage. Some four or five such transfers were made, each transfer involving the introduction of 25-50 aphids into each of five cages where they were allowed to migrate from the detached leafroll leaves to the foliage of the enclosed healthy plants. Two cages of healthy plants from the same lot of tubers were kept as checks. One cage contained leafroll plants on which aphids were colonized for increase and distribution.

When the harvested tubers from these cages were first examined on October 25, very interesting results were found. Necrosis, of the phloem necrosis type, was found in abundance, even at this early date, in all the treated cages. In one of the five cages practically 100 per cent. of the tubers showed the characteristic discolorations. The necrosis was in early stages of development, that is, not extending far from the stem end of the tubers and not showing as extreme necrotic discolorations as are found in tubers later on in the storage period. Microscopic study of stained sections

¹ Burton, Frank A., 1927, "Some Considerations on Prehistoric Aural, Nasal, Sinus Pathology and Surgery." Santa Fe, N. M., pp. 1-38, Figures 1-17.

of these tubers showed the necrosis to be the characteristic phloem-necrosis which is being investigated. The tubers from the two check cages where the vines had been kept free from aphids and from all other insects showed no necrosis.

This is the first instance, so far as the writer is aware, of the production of net-necrosis under control conditions, and the first proof of what has been heretofore a hypothesis, though supported by considerable evidence, namely, a causal relationship between leafroll and net-necrosis.

The suggestion as to the above relationship is not new. Schultz and Folsom in Maine, showed in 1921 that net-necrosis occurred in varying percentages in hills adjacent to and in the near vicinity of leafroll plants. They further characterized the necrosis as a phloem necrosis rather than a necrosis of the xylem of the vascular tissues and suggested that it might be due to the same virus as that causing leafroll. The experiment here reported furnishes strong evidence that the above suggested explanation is a correct one.

The complete data connected with this investigation will be published in a forthcoming paper.

ALFRED H. GILBERT

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"GENERAL ZOOLOGY"

I FEEL that I can not let Mr. H. L. Clark's review of my text-book of general zoology (SCIENCE, VOL. 67, No. 1726) pass without comment. Mr. Clark appears to have two main grievances which (with apologies) he airs at some length. They are (1) the choice of title and (2) the fact that I have omitted all mention of the Echinodermata! I omitted mention of many other groups of the animal kingdom, but I can quite understand that these omissions are nothing like so criminal to him. Mr. Clark is known to us as a very capable investigator of the Echinodermata. I am not sure what experience he has had of teaching work in the universities or higher schools of to-day. He starts off, however, by classifying teachers of zoology into three groups: (1) those stressing structure, (2) those emphasizing function and (3) those magnifying habits and life histories.

I venture to say that this classification is not only incomplete but unjust. There are many teachers of zoology to-day who realize the importance of a broad study of their subject and who endeavor to combine the studies of structure, function, life history and habits.

Now in England in the past it has been customary (and I think the arrangement may not have been different in the United States) to introduce the subject of zoology by a detailed course on the structure

of a limited number of well-known types—amoeba, hydra, crayfish, dogfish, pigeon and rabbit. Many students who took this course never heard anything about the way the structures functioned, and it was very difficult for them to find anything in the literature about the physiology of these common types. This very one-sided study of zoology is now realized to be out of date. There is no need for me to discuss that here; it is universally recognized by the best teachers to-day.

Well, I was asked to write a text-book which would introduce the usual types, so that their structure could be studied in detail in the practical classes *together with a study of function*. The book was not to exceed five hundred pages—quite large enough for the purse of most first-year students in this country. If I had described the morphology of the types at length, I should have simply duplicated much that is found in many excellent text-books already in existence. I, therefore, expanded the functional side and introduced a very considerable amount of information not found in any elementary text-book of zoology or physiology with which I am acquainted. Structure was not neglected, but illustrations were used to save description and to aid the students in their dissections.

I do not apologize for the plan of the book. It is novel and that at least is something these days. To Mr. Clark's rebuke that I have omitted all mention of turtles, echinoderms and the songs of birds I retort that they do not come into our introductory text-books in this country. I still wonder whether he was serious when he wrote about the songs of birds.

My reply to his last sentence is that a student familiar with the contents of my book and with the laboratory training which accompanies it, will have a far better knowledge of animal life than one who has only studied the structure of representatives of a large number of animal groups and a far better training than one who has swallowed a superficial account of chatty nature study.

As to my choice of title "The Elements of General Zoology." Zoology to me is the study of animal life, and physiology is as important a part of it as morphology or taxonomy. I do not belittle either of the latter. The necessity of morphological work is clearly indicated.

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THE PRONUNCIATION OF RESEARCH

IN the issue of March 23, Nicholas Kopeloff expresses the opinion that "overwhelming usage seems to