

the medical school, \$200,000. At the same time the Agricultural and Mechanical Arts College at Stillwater was granted: Science hall, \$100,000; gymnasium, \$100,000.

THE residue of the estate of James Buchanan Brady, which is estimated as more than four million dollars, is bequeathed to the New York Hospital on West Sixteenth Street, New York City, to establish the James Buchanan Brady Foundation for a urological institute, similar to that at Johns Hopkins Hospital at Baltimore, which Mr. Brady had endowed during his life with \$200,000. An additional \$300,000 is left in trust to the Johns Hopkins Hospital for the maintenance of the institute.

THE Harvard Medical School will provide instruction for the senior class during the summer, with two weeks holiday. It is optional with students whether they will begin their fourth year's work on June 4 or September 24.

OWING to the national emergency, the Cornell University Medical College announces that it will continue instruction for members of its senior class throughout the summer so that they may be graduated with the degree of M.D. on or about January 1, 1917.

PROFESSOR C. R. RICHARDS, professor of mechanical engineering and head of the department since 1911, has been appointed dean of the College of Engineering and director of the Engineering Experiment Station of the University of Illinois to succeed Dr. W. F. M. Goss who has resigned to become president of the Railway Car Manufacturers' Association of New York.

DR. CHAS. BROOKOVER, of the University of Kansas, has been elected professor of anatomy and director of the department at the University of Louisville.

DISCUSSION AND CORRESPONDENCE

A VIABLE TEN-YEAR-OLD CULTURE OF *BACILLUS PARATYPHOSUS BETA*

As the usual text-books, manuals and current literature make but little or no mention of the length of life of individual bacteria the following record may not be without interest.

In 1909, when I began teaching bacteriology at Howard University, among the stock cultures of organisms in the laboratory was one labeled "Paratyphoid Schottmüller 1-14-06." It was a deep agar stab made in a narrow test tube and the tube instead of being closed in the usual manner by a cotton plug had been sealed off in the flame. Hermetically sealed, the agar culture had been prevented from drying. The culture had been prepared three years previously by Dr. W. W. Alleger.

On January 17, 1916, ten years and three days after the culture had been made, the tube was broken open and the organisms transferred to Russell double sugar. The characteristic red color and gas did not appear in the butt of the tube on the first transfer. Transfers were then made from this tube to other double sugar tubes at irregular intervals during a couple of months. At about the fifth transfer the organism showed its characteristic reaction on the double sugar. Its fermentation of separate sugars was tried, as well as other cultural tests, and the agglutination test with paratyphoid beta immune serum was done. All these indicated that the organism was *Bacillus paratyphosus beta*.

During the ten years it had always been kept in a closet away from the light, along with the other stock cultures. The temperature in closet varied during the first five years from as high as 32° C. in summer to nearly as low as 0° C. in winter. During the last five years the temperature was never lower than 15° C.

M. W. LYON, JR.

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A METHOD FOR KILLING TURTLES

KILLING turtles for class purposes is more or less of a task depending upon the equipment at hand. Even though a closed tank is available for administering gas, thirty minutes to an hour is required for anesthetizing these reptiles and then they may revive during dissection. Another expedient sometimes resorted to is to place the specimens in boiling water for a few minutes. This has its objections. I have observed attempts to

give an anesthetic or a poison by way of the mouth which is almost impossible. However, substances can be introduced into the alimentary tract through the anus and the desired results obtained.

Such is the method used in this laboratory. Chloroform is injected into the cloaca and a string tied in front of the anus to prevent the ejection of the liquid. Five c.c. of chloroform thus given will anesthetize an eight-inch turtle sufficiently for dissection in thirty to forty-five minutes.

The value of this method is threefold. First, a string and a pipette constitute the necessary equipment; second, the ease with which the anesthetic can be given is evident; and third, there is no danger of the specimens coming out from under the chloroform.

NEWTON MILLER

UNIVERSITY OF UTAH

SCIENTIFIC BOOKS

Combinatory Analysis. By MAJOR PERCY A. MACMAHON. Cambridge University Press. 1915, Vol. 1, xix + 300 pp., and 1916, Vol. 2, ix + 340 pp.

One of the four grand divisions of what may be called properly static mathematics is the theory of configurations. It includes the construction out of given elements of compound forms under certain given conditions or restrictions; together with the characters possessed by such constructions when they are varied under given laws, such as, for instance, the character of transitivity, or that of primitivity; and the laws of dependence of such constructions upon each other; as well as finally the invention of new or ideal elements of mathematics that enable the solution of problems of construction to be effected. These constructions vary from the mere permutation of a linear series of elements up to the complicated trees of chemical combinations studied by Cayley, and in general to all sorts of problems in what has been happily denominated tactics by Cayley, or syntactics by Cournot. We find in its field the construction of magic squares, of Latin squares, of Latin-Greek squares, of triangles, stars, polygons,

chess problems, routes over net works, problems of topography, and without much stretch of imagination we might now include the disposition of the elements of war. The field is obviously large in extent, and in a wide variety of aspects fascinating. From certain points of view one might be tempted to conclude that we could include in it all mathematics, for the definition given by C. S. Peirce made mathematics the science of ideal constructions and their applicability to the world as it is.

The study of configurations usually begins with combinatory analysis. By this is usually meant the study of the arrangements along a line of a collection of objects, either as individuals or in groups; arrangements at the nodes of a lattice; combinations of arrangements. Such problems arise not only as matters of tactic, curious problems or puzzles, but in the determination of the number of such arrangements needed in solving problems in the theory of probabilities.

The treatise of Professor MacMahon undertakes to present some very general methods of handling such studies. These methods consist for a large part in the construction of enumerating generating functions, and involve considerable study of symmetric functions and certain differentiating operators. In the course of this study he arrives at some very elegant theorems. These methods not only enumerate the possible forms, but in many cases afford methods of actual construction of the entire list of such possible forms. They are very powerful and have enabled the author to solve problems that were considered for a long time to be beyond the reach of mathematical analysis. His success and presentation in complete form may induce others to study this important branch of mathematics.

There are eleven sections, and the topics under consideration will give some idea of the character of the treatise. Section one considers ordinary symmetric functions and their connection with the theory of distribution of objects into parcels. The operators which are useful for these purposes are developed, and their algebra considered, turning out to be quite analogous to the algebra of symmetric