to offer the chair of medicine, left vacant by the death of Dr. Charles F. Hoover, to Dr. Cyrus Cressy Sturgis, now professor of medicine in the University of Michigan and director of its research hospital.

JOHN WILSON, assistant chief geologist for the Pan-American Oil Company, has been appointed assistant professor of geophysics at the Colorado School of Mines.

AT the Harvard Medical School, Dr. William E. Ladd has been appointed assistant professor of surgery, Dr. Robert M. Green, assistant professor of applied anatomy, and Dr. Edward P. Richardson, John Homans professor of surgery.

DR. MILO HELLMAN, research associate in physical anthropology at the American Museum of Natural History, has been appointed professor of comparative dental morphology at the New York University College of Dentistry.

DISCUSSION AND CORRESPONDENCE

OVARIAN SECRETION AND TUMOR INCIDENCE

IN an article under this title which appeared in SCIENCE for December 16, 1927, Dr. William S. Murray reports on experiments in which he analyzed the effect of ovarian hormones on the incidence of mammary cancer in mice. In this connection he refers to the historical development of this problem as follows: "It has been known for some time that the internal secretions of the ovaries play an important part in the physiological condition of females during and after the gestation period. That the influence of these hormones has also a direct effect upon the ability of mice to combat the growth of neoplasms has been demonstrated by Dr. L. O. Strong (1922) in his work upon transplanted tumors. Dr. Leo Loeb has "also" (quotation marks added by the writer) published a brief note on the effects of castration and enforced non-breeding on tumor incidence. More recently (1927) Dr. Carl F. Cori has published a very interesting paper on the results of castration and ovarian transplantation in mice."

This statement tends to create an erroneous impression as to the development of our knowledge of this problem. Instead of having "also published a brief note," I have published in addition to this brief note two extensive papers containing detailed data on this question. The first of these appeared as the first article in Volume I of the *American Journal of Cancer Research*, January, 1916, p. 1. The second appeared in the *Journal of Medical Research*, September, 1919, p. 477. In these papers I gave the first experimental proof that internal secretions may play an important rôle in the origin of tumors. I showed that there is a definite quantitative relationship between the time during which the ovarian hormones have had a chance to act on the mammary gland and the incidence of mammary cancer. This I proved through castration carried on in mice at different ages. I also showed that prevention of breeding lowers the incidence of cancer but not to the same degree as castration at an early period of sexual maturity. I furthermore attempted to produce mammary cancer in male mice through transplantation of ovaries without succeeding in this attempt. Dr. Cori also was unsuccessful in similar experiments, while Dr. Murray succeeded in obtaining a positive result in 4 out of 210 operated male mice, therefore in less than 2 per cent. of his animals.

Since my first complete article on this problem appeared, I have repeatedly in various papers discussed the theoretical importance of this question in the etiology of cancer. I may also add that it was only possible for the writer to undertake the study of this problem, because I had for many years previously studied the rôle of heredity in the etiology of cancer in investigations based on the conviction that heredity in cancer can only be satisfactorily analyzed, if different families of mice are bred separately under identical environmental conditions. Accordingly in cooperation with Miss A. E. C. Lathrop, I was able to obtain strains of mice with definitely known inherited cancer incidence which differed in the case of different strains. Thus we could prove the quantitative interaction between hereditary factors and factors founded on the inner environment of organisms. Furthermore I had occasion to point out that there are indications that a similar quantitative interaction exists also between hereditary factors and outer environmental factors. The question as to the effect of various glands with inner secretion on the growth of transplanted tumors is a problem of an entirely different character and experiments of this kind can throw no light on the rôle of hormones in the origin of cancer.

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LAWS RELATING TO MATHEMATICAL OPERATIONS

ONE of the most fundamental differences between the mathematics which preceded the nineteenth century and the mathematics of to-day is the fact that we now lay much more stress on certain laws which govern many of our mathematical operations. Among these are those now known even by the student of