

ments by the Hydrological group showed that with a temperature outside of 40 degrees below zero the entrance to the first grotto, which contains much ice, was at 3 degrees Fahrenheit. The temperature rose steadily as the awed party passed inward through the successive

caverns, reaching as high as 45 degrees Fahrenheit above zero in the innermost cave.

The information obtained by the Leningrad party throws new light on the mode of formation of ice crystals and on the origin of ice caves.

Science News Letter, March 7, 1931

MEDICINE

Improved X-Ray Methods Developed at Mayo Clinic

New Technique Makes Possible Use of X-Ray In Fighting Gall Bladder Troubles and Intestinal Ills

DR. B. R. Kirklin and Dr. H. M. Weber, of the Mayo Clinic, Rochester, Minn., have announced results of new work in the X-ray detection of disease. Dr. Kirklin's work has been on the gall bladder and Dr. Weber's on the large intestine.

The X-ray picture, as is well known, is a shadow, cast in varying density, according to whether the rays can or cannot pass through the tissues. The stomach, intestines, normal gall bladder, and their normal contents allow the rays to pass easily, and therefore do not cast good shadows on the X-ray film. Shadows of gallstones which would stop the passage of X-rays have been seen on films for many years. However, not all gallstones are satisfactorily opaque to X-rays.

The story of the development of methods for getting X-ray pictures of the gall bladder is a long record of brilliant achievement. Briefly, the method is as follows: The patient is given a harmless dye through which X-rays will not pass, and which is gathered up in the gall bladder; then pictures are taken at intervals for a number of hours.

Using this method, until recently it has been considered impossible to distinguish between the shadows of gallstones of low calcium content and papillomas, which are little wart-like growths. However, Dr. Kirklin found a number of features that were characteristic of papillomas and not of gallstones. For instance the shadows of the papillomas were in the same position on all the films, whereas the shadows of gallstones might be in different places on different films; moreover, the shadows of papillomas were not immediately at

the bottom of the gall bladder, whereas the stones would be likely to be there, like marbles in the bottom of a bag. There were, also, other characteristics. Four patients on whom Dr. Kirklin made the diagnoses were operated on, and papillomas were found, as he had predicted, in all four.

The method used by Dr. Weber in taking X-ray pictures of the large intestine was developed by Dr. A. W. Fischer, in Germany, and has been used

also by Dr. J. Gershon-Cohen in this country in the X-ray diagnosis of tuberculosis of the large intestine.

It has been customary, in taking X-ray pictures of the large intestine, to give the patient an enema, in which is suspended some barium, a substance through which X-rays will not pass. Thus, a shadow of the barium-filled intestine is obtained and deformities caused by disease can be seen. The method is good. However, it fails to disclose soft masses that do not cause deformity of the wall of the intestine, but merely project into its cavity.

The new method discloses such masses, including growths called polyps, in which Dr. Weber was particularly interested. The patient takes the enema, as in the old method, but expels it. Then, before the picture is taken, what might be called an air enema is given very carefully. The result is that the polyps, to the surface of which the barium has adhered, are outlined.

To detect the presence of these polyps is important, since they have a tendency to develop into cancer. Also, Dr. Kirklin expects that his discovery that papillomas of the gall bladder can be detected, will be extended to the detection of early gall bladder cancers.

Science News Letter, March 7, 1931

PHYSICS—PSYCHOLOGY

Non-Living Matter May Learn and Remember

THE ABILITY to learn and remember is probably not confined to living organisms.

An important mathematical investigation by Dr. N. Rashevsky of the Research Laboratories of Westinghouse Electric and Manufacturing Company has shown that certain mixtures of lifeless fluid substances ought to show behavior indistinguishable from what we call memory. Properly chosen combinations of liquids will respond to repeated changes in the temperature, pressure or other conditions to which they are subjected, as if they were sensitive to their past experience and could put 2 and 2 together.

Apparently this unique behavior is possible in a system which may come to rest in more than one position. For instance, a rectangular block may be in equilibrium when resting on any one

of its faces. In addition, however, there must be a lag in the changes within the mixture itself, by which when the substance is displaced from its resting condition an appreciable time is required for recovery.

Dr. Rashevsky has actually proved that such mixtures would show Pavlov's famous conditioned reflex which is the foundation of behavioristic psychology.

It is not suggested that this is the exact physical mechanism of memory in living animals. Further, no such mixture has yet been made and tested in the laboratory, though the mathematics makes that sequel probable.

However, this is one of the most daring and well-informed attempts to handle a question of psychology and biology by the method of mathematical physics.

Science News Letter, March 7, 1931