

MICROSCOPY

New Method Shows Scientists Growth of Living Tissue

Application of Development at University of Pennsylvania To Reveal Cell Behavior in Cancer and Tuberculosis

A METHOD which enables scientists for the first time to study over a long period the microscopic details of the growth of living tissue in a warm-blooded animal has been developed in the laboratory of anatomy at the University of Pennsylvania's School of Medicine.

Through its use, the cellular changes in living tissues can be studied as by no other method, and fundamental information regarding the manner in which abnormal cellular reactions occur in infectious diseases like tuberculosis and in tumor growth like cancer will be obtainable.

That such cellular reactions occur has long been known by the end results seen in these diseases, but by enabling the observer actually to see the entire process of cell changes the new method opens the door to enormous advances in knowledge.

The method, for whose rapid perfection and extension the Rockefeller Foundation has made a \$75,000 grant to the university, consists of the introduction of a transparent, double-walled chamber, or "window," into a small hole made in the ear of a rabbit, the perforation being made in much the same manner as the human ear is pierced for the wearing of certain types of earrings.

Look In A "Window"

One side of this "window" is of celluloid or glass, and the other of a very thin sheet of mica. The edges of the space intervening are left in contact with the tissues of the ear and from them the blood vessels and other living tissues invade the chamber until they form a complete new layer.

This new layer, only two-thousandths of an inch in thickness, is quite transparent and it is necessary only to place the "window" under the microscope to see with the most extraordinary clearness at 1,000-fold magnifications the minutest elements—the individual cells—of which animals are made.

Moreover, since the new tissue is permanent and the chambers can remain in place for months without causing any discomfort to the animal, it is possible to make repeated observations and careful studies not only of the exact way in which the new growth occurs, but also of the way the tissue elements behave in conditions of health and disease.

Heretofore there had been no satisfactory region in a warm-blooded animal in which such fine details could be studied on living, growing cells inside the body. Investigators depended either on cutting thin pieces of dead tissue, staining them in various ways, and placing them on glass slides in order to study tissues and cells under the microscopes, or on keeping small pieces of tissue alive in "tissue cultures" outside the body.

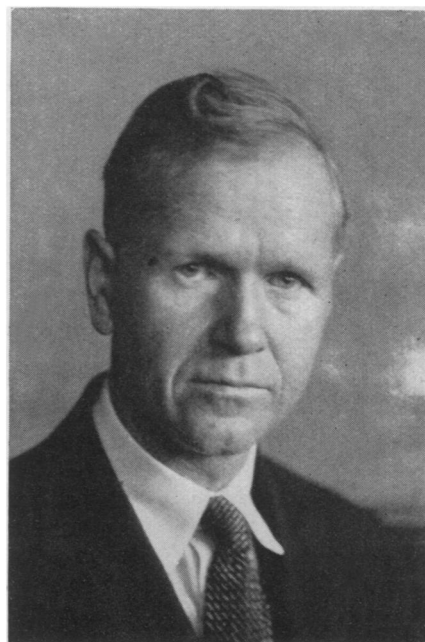
Mrs. Clark Helped

The development of the new method grew out of a number of research projects in which Dr. Eliot R. Clark, professor of anatomy at the university and director of the anatomical laboratory had engaged, and in many of which he collaborated with his wife, Eleanor L. Clark.

Dr. Clark's studies had been devoted to living structures in the lower forms of life, such as fish and tadpoles, cold-blooded animals in whose transparent tail fins or gills it is possible to see with great clearness the finest details of cell structure. It was Dr. Clark's desire to extend these studies to higher animals, and at his suggestion and under his direction the preliminary experiments were carried out by Dr. J. C. Sandison, of the department of anatomy.

These experiments demonstrated the practicability of the "window" method, and the Rockefeller Foundation subsequently made a grant of \$15,000 a year for five years for the rapid perfection and extension of the method.

Aided by this grant, the technique of constructing the chambers and inserting



DR. ELIOT R. CLARK

Who prompted and assisted in the development of a new technique which for the first time reveals living tissue for study under the microscope over a long period

them has been developed by Dr. Clark and his wife, Dr. R. J. Williams and other research workers in the laboratory to such a point that a wide variety of studies in different fields of medicine may be carried out by this method.

Various modifications of the chambers have been devised to meet the solution of different types of problems and some of these types have been standardized. One such type, instead of allowing a space for the growth of new tissues, provides for the retention of some of the original tissue with its small blood vessels still circulating in a thin space between transparent walls.

Another type has a small hole in the bottom of the chamber for the purpose of "transplantation" of tiny bits of tissue from other parts of the body so that studies similar to those carried out by the many workers who are using the famous "tissue culture" method devised by Dr. R. G. Harrison, of Yale, may now be pursued on living cells inside the animal body.

Moving Pictures Successful

Successful moving pictures of the circulation of the blood in these chambers have recently been taken by Dr. E. A. Swenson, a member of the staff of the laboratory of anatomy.

Studies which have already been

made by this method have yielded a wealth of new facts regarding the way in which the minute elements of the body grow and behave in conditions of health, and enough preliminary observations also have been carried out to establish the value of the method in the study of diseased conditions.

The process employed in the "window" method was demonstrated to physicians from this country and abroad last week during the celebration of medical progress held in the University of Pennsylvania's School of Medicine.

Science News Letter, October 18, 1930

ASTRONOMY

Uranus and Neptune Without More Moons

IF THERE are any more satellites of the planets Uranus and Neptune, in addition to those already known, they are exceedingly faint. For many years four moons of Uranus have been known and one of Neptune. With the aid of photographs made with the 60-inch reflecting telescope of the Mt. Wilson Observatory, William H. Christie has made a search for additional satellites of these planets, giving time exposures of one to three hours' duration. However, no such object has been found, and so Mr. Christie concludes that if there are any additional satellites, those of Uranus are not brighter than the 19th magnitude and of Neptune not brighter than 18.5 magnitude.

Science News Letter, October 18, 1930

PHYSICS

Atomic Projectiles Sought to Release Energy of Atom

California Physicists Find a Way to Speed Up Hydrogen Proton Without High Voltage Vacuum Tube Troubles

THE PRODUCTION of atomic projectiles of tremendous speed, capable of smashing the hearts or nuclei of gold and other elements, perhaps transmuted them into other substances or releasing large quantities of atomic energy, is promised by a new experiment which has been reported to the National Academy of Sciences by a young University of California professor of physics, Dr. Ernest O. Lawrence, and his associate, Dr. N. E. Edlefsen.

It has long been the desire of scientists to have swiftly moving particles of high energy with which to bombard the compact and unknown center of atoms but the difficulties of producing high voltages of a million or more, necessary to generate such energies in an X-ray or vacuum tube, have stood in the way.

Protons Given Kicks

Professor Lawrence has devised a method for speeding up the proton, or heart of the hydrogen atom, in such a way that the troubles of operating

vacuum tubes at such high potentials are avoided. Although he has not yet produced the high speed protons, with energies of million volt-electrons or so that are needed, his apparatus has operated successfully and he believes that it is merely a matter of time and effort before the desired high speed protons are produced.

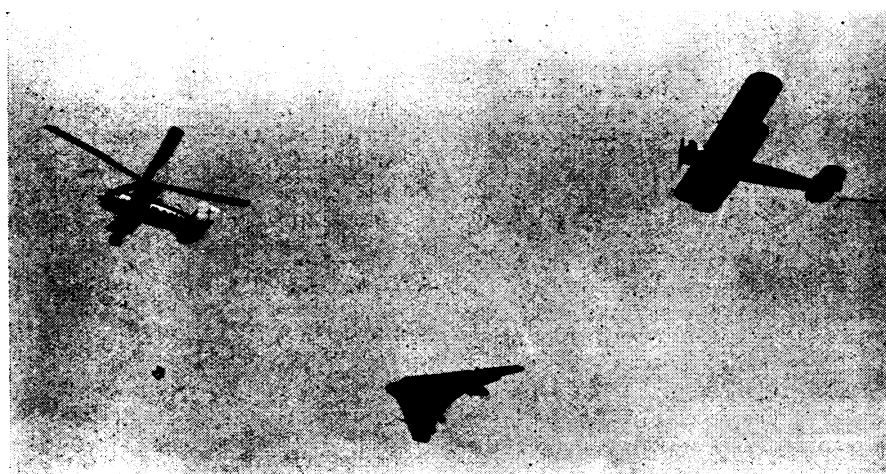
Protons are chased around electrically in such a way that they are given repeated kicks that constantly increase their speed and energy and finally they shoot out of the apparatus to attack the heart of another element.

Hydrogen is stripped of its electrons leaving the nucleus or proton. An electric current seizes the proton and jerks it across the space between semicircular hollow plates. As the proton goes to the other side it is bent in its path by a strong magnetic field acting perpendicularly and just at that time the electric current is reversed in direction and the proton is pulled back again. This happens over and over again in the vacuum in such a way that the proton is accelerated in a spiral path and finally is flung out with high energy. Oscillations of 10,000 volts and 20 meters wavelength, impressed on plates eight inches in diameter in a strong magnetic field are necessary and it is believed that these can be achieved without great difficulty.

Eagerly Awaited By Scientists

Scientists eagerly await the day when they will be able to test the current speculation that quantities of energy are locked up in the heart of the atom. This idea, seriously advanced by leading physicists, has been the basis of fiction and drama that pictured successful bombardment as starting a progressive conversion of matter into energy that destroyed the world in a gigantic explosion. The idea that matter and energy are interchangeable is a consequence of the Einstein theory and the newer physics.

Science News Letter, October 18, 1930



STRANGE PLANES IN FORMATION

Left to right—The windmill autogiro, which can be throttled down to 30 miles an hour; and the tailless pterodactyl and the slotted wing Handley-Page, both of which greatly reduce the stalling hazard. These are "freak" airplanes now, probably in the same way the Wright brothers' plane was a freak at Kitty Hawk a quarter of a century ago. They were photographed together at a display of the Royal Air Force in England.