

MEDICINE

Clue to Virus Origin

By a yet unknown process the polio virus reduplicates itself in the nuclei of the cells of the human body. The virus was heretofore thought to exist only in the cytoplasm.

➤ A NEW chemical attack on polio has given scientists at Yale University in New Haven, Conn., a working theory of the origin of the virus and clues to the problem of immunity and resistance to it.

The polio virus, according to this theory, is manufactured by cells of the human body, with the first virus that invades the body serving as a template. But whether the virus reduplicates itself or is made by the cells of human spinal cords, the manufacturing process goes on in the nucleus of the cells.

Findings supporting this new approach to the polio problem were announced by Drs. Joseph L. Melnick and John B. LeRoy of Yale University School of Medicine at the Congress of the International Society for Cell Biology in New Haven, Conn.

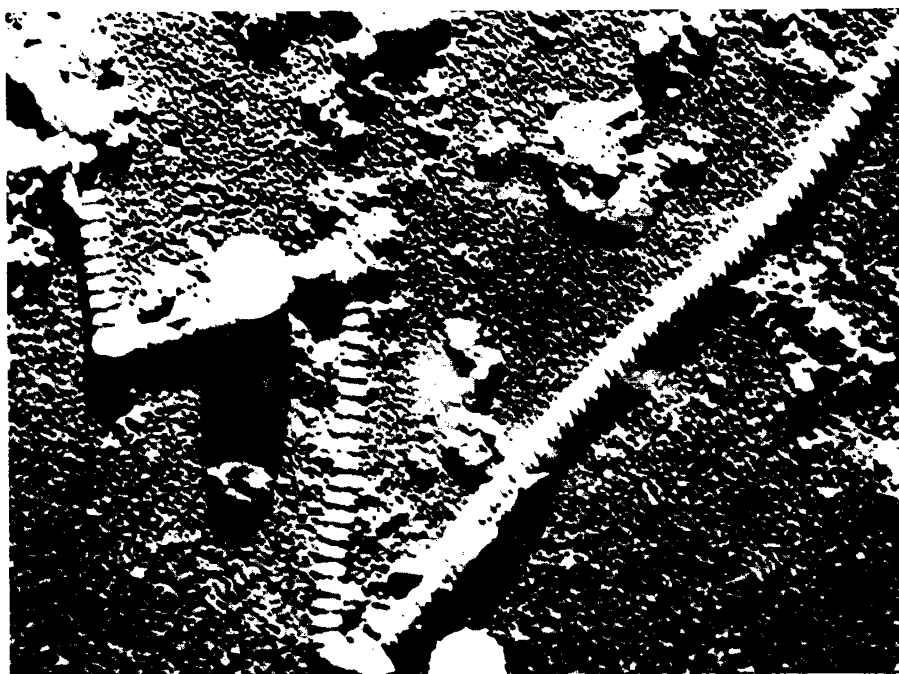
Scientists heretofore have thought the polio virus existed only in the part of the cell called the cytoplasm, which is the fluid that bathes the nucleus. Finding it in the nucleus may explain, for example, why a person who had polio at the age of two

might still have antibodies to the virus in his body at the age of 70 years. Small amounts of the virus may have been locked away in the cell nucleus all the time, giving rise to the antibodies.

How the virus attacks and ultimately causes the breakdown of cells in the spinal cord, the part of the body most severely affected during polio, could also be explained by the new theory. Within the nucleus is a particle called the nucleolus. The virus may make enormous demands on the manufacturing process in this nucleolus which eventually result in the complete breakdown of the cell structure.

Finding the polio virus in the nucleus of the cells also gives "new light" on the relationship of fatigue to polio.

Many parents as well as doctors know that being over-tired at the time polio attacks makes the victim more liable to paralysis. The proteins of the cell nucleus, Swedish scientists have found, are consumed rapidly after a period of fatigue and are re-formed at a much slower rate.



NUCLEOPROTEIN "EARTHWORM"—The electron microscope photograph shows a section of a nucleoprotein thread, indispensable substance of life, from cells in the spinal cord. Nucleoproteins are also found in viruses. The "earthworm" segments measure two millionths of an inch in length, and the white balls are signposts of artificial rubber which are added to the preparation for purposes of measurement.

"It would seem," Dr. Melnick said, "that the less fatigue an infected individual is subjected to, the greater would be the chances of maintaining adequate supplies of cellular nucleoprotein and preventing the onset of paralysis."

Nucleoprotein, one of the materials essential to all life in the structure of cells, has an earthworm-like appearance when seen via electron microscope photographs.

Science News Letter, September 16, 1950

CHEMISTRY

Electrical Attraction Is First Virus Attack Step

➤ A THEORY that electrical attraction governs the first step in the attack of disease-causing viruses on body cells was reported to the American Chemical Society meeting, Chicago, Ill.

Blocking this attraction would be the way to give immunity to the virus, according to this theory.

The blocking is possible, laboratory experiments confirmed by radioactive tracer studies show, Prof. Theodore T. Puck of the University of Colorado Medical Center, Denver, finds.

Viruses are the causes of a wide range of diseases from poliomyelitis to the common cold. Prof. Puck's studies were made with a virus that does not cause human disease but is representative of viruses in general and is suitable for laboratory experiments.

The virus attacks the cell by a two-step process, Prof. Puck found. In the first step, attachment to the cell results from a purely electrical attachment governed by charged metallic atoms, or ions, normally present in the cell's environment. Introducing certain other metallic ions, not ordinarily present, blocks this attraction.

In the second phase of the attack, the virus becomes a part of the cell. This step cannot be reversed. The length of the period between the first and second steps, during which the ionic counter-attack must be made, is not yet known.

Science News Letter, September 16, 1950

BIOLOGY

Previral Units Are Forerunners of Virus

➤ A NEW theory of how disease-causing viruses multiply within the cells of the body was announced by Drs. Geoffrey Rake and Harvey Blank of the Squibb Institute for Medical Research, New Brunswick, N. J., and the University of Pennsylvania and Children's Hospital, Philadelphia, at the Fifth International Congress for Microbiology in Rio De Janeiro, Brazil.

In the early stages of virus multiplication, according to the new theory, there are "previral units." These are smaller than

the fully formed virus particles with which scientists have previously been familiar.

The fully formed virus particles seem to be made up of a number of previral units around which a matrix of other material forms.

This picture of how viruses multiply within the cell was developed from studies with the virus of *molluscum contagiosum*. This is a skin disease affecting only the superficial layers of the skin. The virus producing it has characteristics placing it in the group of pox viruses which produce such diseases as smallpox, chickenpox and, in animals, cowpox. The surface skin lumps produced by this virus develop slowly

and are benign in nature. This makes it easy to obtain large amounts of material for examination.

New and delicate methods of tissue staining were applied to the infected cells and fragments of cells affected by this virus. They were then examined under the electron microscope. From these studies came the new theory of virus multiplication. It is considered of great theoretical importance because heretofore very little has been known about the early stages of the multiplication of viruses inside cells, with the exception of bacteriophages, which are viruses that prey on bacteria.

Science News Letter, September 16, 1950

AERONAUTICS

Private Planes in War

► THE part that American private planes can play in total or partial war emergencies is outlined in a special report just made to the U. S. Civil Aeronautics Administration by a committee of 12 experienced airmen.

This nation's non-scheduled aviation industry is an irreplaceable reservoir of talent and equipment of tremendous potential value in the defense of the United States, the report states. There are more than 60,000 active aircraft, almost one-half million trained pilots and some 5,000 operating non-military airports in the United States.

These rich civil aviation resources of the nation must be preserved and encouraged so that they will be available to military and civilian defense agencies as the need arises, the committee declares. The majority of airmen accepts the principle that internal security is the most important consideration involved in all flight operations and that certain steps should be taken immediately to guarantee that security.

During a period of active air defense

there are two particular problems of military concern. The first is the positive identification of all aircraft operating within "sensitive" military areas. The second is the prevention of unauthorized use of civil aircraft for purposes of sabotage or espionage.

Sensitive military areas are those where a continuous watch by radar tracking and ground observation is maintained. To prevent sabotage or espionage, satisfactory controls covering security clearance of airmen, operational controls and identification of aircraft are essential.

Among various suggestions made by the committee is the installation of equipment on aircraft so that air-to-ground communications on very high frequency channels may be maintained. It is also recommended that all pilots carry an identification card containing fingerprints, photograph, full name, signature and personal description.

Registration with a State Defense Council or "control airport" should be required for all aircraft, the report states. All pilots

should, if possible, file flight plans. Some of the recommendations will be implemented at once, D. W. Rentzel, the head of CAA, announces.

Science News Letter, September 16, 1950

● RADIO

Saturday, September 23, 3:15-3:30 p.m. EDST

"Adventures in Science" with Watson Davis, director of Science Service over Columbia Broadcasting System.

Mr. Davis will discuss "The First National Science Fair" with educators and finalists.

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