BIOCHEMISTRY

Cells' DNA Replaced

Deoxyribonucleic acid, the mystery chemical essential to inheritance, can be replaced in its cell functioning by certain negatively charged molecules.

➤ OTHER CHEMICALS can substitute for DNA, the mystery chemical compound that plays an essential life role in transmitting hereditary characteristics.

An electrically negative charge seems to be the key to DNA substitution.

DNA, or deoxyribonucleic acid, was removed from isolated cell nuclei and, as expected, the nuclei could not make protein or nucleic acid. However, some synthetic compounds—one of them related chemically to clear plastic wrapping paper—will act as DNA substitutes.

The experiments were reported by Drs. V. G. Allfrey and A. E. Mirsky of the Rockefeller Institute at the National Academy of Sciences meeting at Berkeley, Calif.

The key to their ability to substitute for DNA seems to be the fact that the synthetic molecules form in long chains and have many repeating negative charges. Both of these are also characteristic of DNA, the scientists explained.

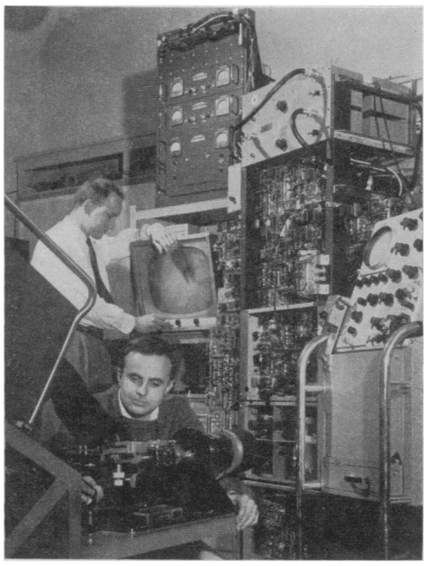
Although large negative molecules such as the anti-blood clotting agent heparin could substitute successfully for DNA, large electrically neutral molecules were ineffective.

They also found that positively charged substances inhibit the synthesis processes in the nucleus. Since the nucleus contains a variety of such compounds called histones, the scientists believe histones may control nuclear activity by masking DNA's negative charge. A direct test of this theory has been made, Drs. Allfrey and Mirsky reported. A histone fraction prepared from thymus cell nucleus was added to isolated thymus cell nuclei and was found to inhibit protein synthesis.

Without its DNA, the nucleus cannot make protein or nucleic acid nor can it build up an energy reserve in the form of ATP or adenosine triphosphate.

It may be possible some day to control nuclear activity in the whole living organism by administering compounds that will shift nuclear charges. "This is a hopeful aspect for research on hereditary diseases in man, many of which are essentially the result of disordered nuclear function," the scientists concluded.

Science News Letter, November 22, 1958



PARTICLE TRACKER—"Terry", a device that counts the tracks left by atomic particles, is a combination microscope, television camera and electronic computer. Prof. Paul V. C. Hough (back) and Wentworth Williams of the University of Michigan examine the device.

ASTRONOMY

Top Astronomy Events

The most important events in astronomy during 1958 included intensive studies of Mars, discoveries of the nature of the Milky Way, and further improvements in observing instruments.

➤ THE TOP astronomical events of 1958 have been selected by Dr. Harlow Shapley, former director of Harvard College Observatory.

Included among the past year's highlights, he told SCIENCE SERVICE, are the following:

1. The intense study of Mars by spectrograph, photometer and radio waves, including the possibility of bouncing a radar echo from the planet as has already been done with the moon.

2. The discovery that the center region, or nucleus of the Milky Way galaxy is expanding, found from observations with the 82-foot radio telescope in Holland.

3. The suggestion that the moon's surface is a honeycomb of solidified dust, caused by the melting and frothing of its dusty surface when bombarded with meteorites.

4. The discovery of 86 stars definitely known to have magnetic fields, and another 65 stars suspected of having them.

5. A more precise determination of the earth's shape resulting from measuring the depth of the ocean when atomic submarines traveled under the North Pole.

6. The start on construction of a 140-foot steerable radio telescope at the National Radio Astronomy Observatory, Green Bank, W. Va.; announcement of plans by the U.S. Navy to build one of unspecified design having an aperture more than 400 feet at nearby Sugar Grove, W. Va., and the construction by Russian scientists of a radio telescope 425 feet in diameter.

7. Good progress by Russian astronomers in construction of a 105-inch reflecting telescope that will be the world's third largest instrument when completed.

Dr. Shapley said his selections were not necessarily listed in order of their astronomical significance. He also reported that the Russians are conducting a contest for the best design of a monument to commemorate the launching of Sputnik I on Oct. 4, 1957.

Science News Letter, November 22, 1958

HEMATOLOGY

Hemoglobin Duplicated In Test Tube

➤ THE FIRST successful duplication of hemoglobin of red blood cells under "test tube" conditions has been reported.

Hemoglobin is the oxygen-carrying protein in red blood cells. It consists of 16 different amino acids. This protein was "manufactured" in a test tube by Dr. Richard S. Schweet at the City of Hope Medical Center, Duarte, Calif.

Dr. Schweet used a technique that enabled this important protein to develop free from living cells. He extracted microsomes from immature red blood cells of rabbits. Microsomes are the tiny "protein factories" within all living cells. These, in their natural state, produce hemoglobin almost exclsively.

Dr. Schweet tagged with radioactive carbon an amino acid used by microsomes in their production of hemoglobin. Then he added the other 15 amino acids.

When he was able to isolate radioactive hemoglobin from the test tube mixture, he concluded that the microsomes had used the tagged acid to manufacture the newly made hemoglobin in a cell-free system.

These findings now make it possible to study the production of a given protein in a detailed manner that was not possible before.

This research, reported in the *Proceedings of the National Academy of Sciences* (Oct.), was supported by the American Heart Association and the National Science Foundation. Mrs. Esther Allen, research assistant, also at City of Hope, and Dr. Hildegard Lamfrom, biologist at the California Institute of Technology, assisted in the project.

Science News Letter, November 22, 1958