GENETICS

Heredity's Secret Studied

See Front Cover

SCIENTISTS may gain new insight into the chemical secrets of heredity as a result of a new technique for studying DNA, the substance that controls vital activities in all living cells.

The technique, developed at Harvard University, involves "unzipping" the two-stranded DNA molecule in solution in such a way that it may be reassembled without destroying its biological activity.

DNA (deoxyribonucleic acid) is found in the nuclei of cells and acts as a blueprint for making enzymes and other proteins. When a cell divides, this "chemical of heredity" is duplicated so that both new cells receive a complete set of "instructions."

The DNA molecule is composed of two long strands of atoms twisted together into a helix, like a spiral staircase. Between the two strands, like steps in the staircase, are hundreds of smaller groups called bases, in pairs. Only four kinds of bases are found and their particular arrangement along the DNA molecule is thought to be the code containing the hereditary information.

Harvard scientists, led by Drs. Paul M. Doty and Julius Marmur, have found that, under the right conditions, the DNA molecules in solution can be "unzipped" by heat and reassembled into their typical two-stranded form by cooling the solution slowly. When they cooled the solution rapidly, the molecules remained two separate chains of atoms, they reported in the Proceedings of the National Academy of Sciences, April 1960.

The electron micrographs seen on the cover of this week's SCIENCE NEWS LETTER show, on the left, slowly cooled molecules with the long twisted form of natural DNA, and, on the right, quickly cooled molecules that have lost their thread-like form. The white spheres are bits of polystyrene used as measuring standard.

The researchers have thus been able to build hybrid molecules, using half of the DNA from two different strains of bacteria, that work just as well as natural DNA in the cells of bacteria. They have also "crossed" the hereditary material of two different species in a test tube by building hybrid molecules with DNA elements from two species of bacteria.

In addition, the scientists found evidence that a gene, or unit of heredity remains active even if situated on just one of the two strands.

With this new technique, scientists can put together in the test tube DNA molecules that have never before existed.

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"UNZIPPING" DNA — Drs. Paul M. Doty (left) and Julius Marmur (above) found at Harvard University how to "unzip" the DNA molecule and reassemble it without destroying its biological activity. They will now be able to build entirely new DNA molecules and test their effects in living cells. Dr. Marmur is shown with a model of a part of the DNA molecule.

MEDICINE

More Potent Polio Shots

A POTENT new polio vaccine has proved more effective than Salk shots, clinical tests indicate.

The purified, killed-virus vaccine was tested on four groups of children and produced an immune response to all three types of polio virus in 91% of the cases. Salk vaccine immunized 63% of the children tested.

At a symposium on polio vaccines in Newark, N. J., Dr. Maurice R. Hilleman, of Merck Sharp & Dohme Research Laboratories, West Point, Pa., said that the comparisons are all the more significant because the Salk vaccine selected for the trials was of extraordinarily high potency.

An important problem with Salk vaccine, Dr. Hilleman pointed out, has been the variation in potency of the vaccine from lot to lot. Recent studies have shown that the antibody response to two doses of the ordinary vaccine may be relatively low for Types I and III polio virus.

The best vaccine would be one that could produce immunity to all three strains of polio without fail. The vaccine should do this in one or two doses of small amount, supplemented by a third dose seven months to one year later. These qualifications were set up by Dr. Salk himself.

The new vaccine, purified for greater potency in a smaller dose, contains no detectable monkey kidney tissue (on which the virus is grown). Thus the possibility of damage resulting from multiple injections of kidney antigen is greatly reduced.

Because of the high concentration of the practically pure virus material, the new vaccine can be given in doses of one-half cubic centimeter, compared with one cubic centimeter of the commercial vaccine.

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ARCHAEOLOGY

Excavated Mayan Stela In Style New to Tikal

A CARVED Mayan stone monument of yet unknown dimensions is being uncovered at Tikal in the jungle of northern Guatemala.

A team of University of Pennsylvania Museum archaeologists reported that they have so far dug out 79 inches of the monument which is 30.5 inches wide and 20 inches thick.

The stela, as this type decorated monument is called, bears the Mayan date 9.0.10.0.0. 7 Ahau 3 Yax which is believed to correspond to Oct. 19, 445 A.D. This makes it 1,515 years old.

The decorations so far uncovered include 160 carved hieroglyphs on the back side, preceded by a large one. The right side is decorated with a human figure and other hieroglyphs. The left side and the front of the monument are not excavated yet, and its actual height is still unknown.

The style used on the stela is unusual for Tikal, the ancient Mayan metropolis where it was found. Tikal was one of the important Mayan centers thought to have been inhabited from 1500 B.C. to 900 A.D. when it was abandoned for still unknown reasons.

The stela was found buried below the central temple of the North Acropolis, facing the great plaza of Tikal. A large tomb that will be excavated in the near future has also been found in the same area, the scientists reported.

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