

BIOCHEMISTRY

Will Man Create Life?

A copy of a viral RNA or ribonucleic acid can duplicate itself indefinitely in a test tube, thus giving a tool for understanding the mystery of life—By Faye Marley

► CREATION OF LIFE in a test tube appears to be closer than scientists have dreamed possible.

Progress in the synthesis of RNA, or ribonucleic acid, is reported from the University of Illinois, where Prof. Sol Spiegelman used a purified enzyme to start the self-duplicating process in a test tube. He mixed the enzyme with RNA virus genes and four triphosphates.

Starting with a copy of a viral RNA, new RNA is synthesized and this can in turn direct the formation of genes and reproduce indefinitely.

With his four co-workers, Dr. Spiegelman described his synthesis work in the Proceedings of the National Academy of Sciences 54:919, 1965. He plans to give a further report Oct. 13 during the National Academy meeting at the University of Washington in Seattle.

Dr. Ichiro Haruna, on leave from the Institute for Virus Research of Kyoto University, Japan, is one of the collaborators in the present research.

They examined the infectivity of the synthesized material. The research includes experiments demonstrating that the "RNA produced by replicate is fully competent to program (direct) the production of complete virus particles."

The researchers, using 15 test tubes, transferred a few of the RNA molecules from the first to a second test tube, and then a

few RNA molecules to another, until the 15th tube was reached. Dilution of the original material in the 15th test tube was such that less than one molecule of the original was present.

A standard test showed that this last tube as well as the others contained viral RNA molecules that had reproduced in the synthetic mixture.

The virus these researchers used reproduces through an RNA molecule. For other forms of life, and some viruses, reproduction involves both RNA and DNA, or deoxyribonucleic acid. Dr. Spiegelman predicts that methods soon will be developed that will apply to the DNA viruses also.

Dr. Spiegelman and his team plan to study next how the viral RNA reproduces itself. If this happens in a one-step process, a completely new method of replication will have been found.

The other collaborators in this research were Prof. George S. Beaudreau, who has returned to the department of agricultural chemistry at Oregon State University, Corvallis, Dr. Ian B. Holland, on leave from the department of genetics, University of Leicester, England, and Donald R. Mills of Bloomington, Ind., who is a doctoral student at the University of Illinois.

The research was supported by grants from the U.S. Public Health Service, the National Cancer Institute and the National Science Foundation.

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Gene Specificity Aided

► A NEW KIND of RNA, ribonucleic acid, has been discovered in Pasadena at the California Institute of Technology.

This RNA is linked chemically with a histone, a protein that modifies the action of some genes and permits others to function, thus regulating the processes of life.

SCIENCE SERVICE reported preliminary work by Drs. Ru-chih Huang and James Bonner in June 1962. At that time these California biologists reported that histone is the chemical key that tells the millions of cells in the body when and when not to reproduce themselves.

The present finding, reported in the Proceedings of the National Academy of Sciences 54:960, 1965, is of interest because the RNA "may provide the histones with their specificity, giving them instructions as to which genes to repress," Dr. Bonner said. Dr. Bonner, with Dr. Ru-chih Huang, discovered the new RNA in pea embryo cells.

Earlier the biologists showed that when histone is present, that is, wrapped around

the genes, much of the genes' activity is halted. When histone is removed, activity is resumed. As in the present work, they used fast growing cells of the embryos of peas to make their discovery.

The new research shows that native histone molecules in the pea bud chromatin contain RNA molecules chemically linked to them. Chromatin is a network of fibers in a cell's nucleus that carries the genes. The histone-RNA differs from other RNAs in chemical composition and in the length of its nucleotide chain. Each of these RNA molecules is built of 40 nucleic acid building blocks and is unusually rich in dihydrouridylic acid.

When it was known that histones repress gene activity, it was asked, how do the histones know which genes to repress?

The new discovery shows that the histones must carry the directions with them. The biologists are seeking to learn if the new RNA does give the histones specificity.

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National Gypsum

HOT FOOT—In just five minutes a temperature of 1,000 degrees F. can be produced by the 80 gas jets (one row shown) in the floor-ceiling furnace used to test floor-ceiling structures.

PHYSIOLOGY

Non-Hibernating Animals Put Into Winter Sleep

► FOUR ANIMALS that do not ordinarily sleep the winter through were put into hibernation recently by injections of extracts from the brain of the ground squirrel, a hibernating animal.

Cats, dogs, rats and mice were used in the experiment, reported Dr. Leonard R. Axelrod of the Southwest Foundation for Research and Education in San Antonio, Texas.

Scientists are probing into the secrets of hibernation with the idea that the information could be applied to human beings.

For instance it might be safer to put people undergoing surgery into the deep sleep of hibernation instead of using anesthesia.

Since the mechanism of hibernation drastically reduces the blood flow and arrests consciousness, scientists believe it has unlimited potentials for surgically treating aged and infirm people. It is also conceivable that astronauts could be put into a hibernating state during their lengthy journeys to distant planets.

Dr. Axelrod has been working on the project with Dr. David Baeder of Mallinckrodt Chemical Works of St. Louis, Mo.

Other animals such as chipmunks, hedgehogs, badgers and bats—but not bears—go into the deep protective sleep as winter comes to their environment. Their body temperatures drop to that of their surroundings, their heart and respiration rates are reduced and all normal body processes slow down.

The animal remains in this state until it is awakened by warming spring weather.

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