

BIOLOGY

Germ Stuff Makes Virus

► SCIENTISTS have reported a dramatic achievement in modern biochemical "alchemy" marking another key advance in the current fast-paced biological revolution.

In effect, they showed that it is possible to change the raw materials of a bacterium into the stuff that makes a virus.

But more important, their findings provide the most clear-cut evidence yet reported to show that the life-forming genetic code constitutes a common "language" understood by all living cells.

Here's what the unique cross-country experiment showed:

That enzymes and other protein-building substances from a bacterial organism that normally lives in the digestive tract can "read" the genetic message of code-bearing nucleic acid from a virus that normally infects tobacco plants.

Given the proper chemical code, the same bacterial system could probably manufacture the protein that makes up any living organism, the scientists now believe.

The results are expected to have far-reaching implications, particularly in simplifying the task of researchers in many centers who are making rapid progress in deciphering the code itself.

The latest report, published in the Proceedings of the National Academy of Sciences, May, 1962, describes a remarkable piece of scientific collaboration joining virus work on the University of California's Berkeley campus with the bacterial approach by scientists at the National Institutes of Health at Bethesda, Md.

The authors are Dr. Akira Tsugita, former post-doctoral fellow in the Virus Laboratory at Berkeley (now at Osaka University in Japan); Dr. Heinz Fraenkel-Conrat, pro-

fessor of virology at Berkeley; Dr. Marshall W. Nirenberg, biochemist at the National Institute of Arthritis and Metabolic Diseases; and Dr. J. Heinrich Matthaei, former NATO postdoctoral fellow at Bethesda (now at the University of Tübingen in Germany).

Key elements in the experiment were:

1. Ribonucleic acid (or RNA), the single-stranded code-bearing chemical derived from tobacco mosaic virus. Normally coated with a specific viral protein, the chain-like RNA molecules (made up of some 6,500 chemical links) determine the genetic "message" and the infectious properties of the virus.

2. A "protein-incorporating system" extracted chemically from *Escherichia coli*, a common single-celled bacterium that inhabits the digestive tracts of man and animals.

Lacking from the bacterial system (because the scientists had "killed" it with a special enzyme) was deoxyribonucleic acid (or DNA), the double-stranded form of nucleic acid that normally carries the genetic "message" in bacteria and in the genes of all higher plants and animals including man.

In place of the normal DNA, the scientists introduced "abnormal" RNA from the tobacco mosaic virus into the bacterial system.

What happened, they report, was a 75-fold stimulation in protein synthesis—in other words, a large quantity of new protein was constructed from amino acids at the direction of the viral RNA.

But the question remained: was this new protein actually the highly-specific type that normally coats the virus particles?

Seeking the answer, the scientists followed a number of complex experimental approaches utilizing the radioactive "label" of

carbon-14: for example, they determined the location of specific amino acids in the protein molecules, and they reconstituted whole virus particles from the synthetic protein and additional RNA.

They concluded that "some of the protein was similar if not identical to tobacco mosaic virus protein."

And this result, they pointed out, "clearly indicates that the genetic code is quite similar for widely divergent organisms, and thus probably is universal."

• Science News Letter, 81:357 June 9, 1962

GENERAL SCIENCE

U.S. Participation Asked In Belgium Nature Camp

► ONE OR TWO American science students have the opportunity of joining in an international camp devoted to biology and geology studies at Dixmude, Belgium, held under Belgium official auspices as a part of the Belgium science youth program. The camp will be held July 3-13, and application should be airmailed or cabled to Jeunes Scientifiques de Belgique, 147 Chaussée de Haecht, Brussels.

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GIANT STEEL SERPENTS—The world's largest truck crane is being used to erect the steel skeletons for the ultramodern columns of the Dulles International Air Terminal building. These steel skeletons will be encased in concrete. From the columns a cable-hung roof will be suspended. To pour concrete for the curved columns, which lean outward to resist the pull of the cabled roof, forms of glass-fiber sheets and plywood are used.

VETERINARY MEDICINE

Hog Cholera Vaccine

► PROTECTION of swine from hog cholera by use of a vaccine prepared from virus isolated from a disease of cattle has been reported 90% successful.

The vaccine was prepared at Cornell University, Ithaca, N. Y. Field trials in Florida were under the general direction of Dr. James A. Baker, director of Cornell's Veterinary Virus Research Institute, who originated the new vaccine method.

The "remarkable" new concept is based on group responses of viruses rather than on the present concept of specific antibody response to either killed or weakened live virus of the specific disease itself.

Further research might make possible one master vaccine to provide both man and animals with protection against any virus disease, Dr. Baker believes.

Hog cholera was chosen to test the new concept because the disease is normally fatal to swine. This one disease has been estimated to cost more than \$100,000,000

a year in the United States. Dr. Baker, who more than 15 years ago did similar work with rinderpest in cattle, said this new type of vaccination will be a great advantage because there should be no question of a vaccine becoming deadly or spreading disease accidentally.

In the work with hog cholera, specific hog cholera antibodies for protection against this disease are not produced in the vaccinated swine unless the animals come in contact with the disease. But if exposure does occur, the right antibodies are produced to give rapid protection.

The Florida field tests were conducted through the cooperation of the Federal Government, the Florida State Department of Agriculture and a number of Cornell staff members.

In spite of the excellent results, Dr. Baker said this type of vaccine would not be available overnight. A great deal of additional research is needed.

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