BIOCHEMISTRY

Key to Life Closer

The structure of a nucleic acid, determined for the first time, brings science closer to understanding proteins and the control of viral diseases—By Faye Marley

➤ SCIENCE has come one step closer to discovering the secret of life.

Dr. Robert W. Holley and his collaborators at Cornell University, Ithaca, N.Y., have determined for the first time in history the structure of a nucleic acid, which is a carrier of hereditary messages.

The type of nucleic acid the researchers studied is one of the smallest biologically active nucleic acids known. It is an alanine transfer RNA, or ribonucleic acid, isolated from yeast. The transfer RNAs carry activated amino acids to the site of protein synthesis.

Dr. W. H. Allaway, director of the U.S. Department of Agriculture's U.S. Plant, Soil and Nutritional Laboratory at Cornell, in which Dr. Holley and his associates did much of their work, told SCIENCE SERVICE that their findings contributed to an understanding of how proteins are put together.

This basic work could lead to a development of solutions to nutritional problems as well as provide background for understanding many important processes of living cells, Dr. Allaway said.

The poor quality of protein in human diets is a problem in many countries. The disease kwashiorkor, for example, is caused by protein deficiency and accounts for the death of an estimated one-third of infants and small children in developing countries.

Dr. Holley, who is a professor of biochemistry at the New York State College of Agriculture at Cornell, received $170,000 for support of his work from the National Science Foundation. He also received additional support from New York State.

Alanine transfer RNA was one of three transfer RNAs that Dr. Holley and his coworkers isolated in pure form for the first time in 1962. They had worked three years to isolate tyrosine and valine, along with alanine, all of which were obtained from yeast.

The achievement of the first complete nucleotide sequence in alanine transfer RNA provides a basis for future attempts to synthesize a biologically active nucleic acid, a detailed report in Science, 147:1462, 1965, stated. The journal gives illustrations of large oligonucleotide fragments that were crucial in the proof of structure.

"Determination of the structure of the alanine RNA indicates that the structures of other nucleic acids can also be determined," the report concluded.

SCIENCE SERVICE in 1962 pointed out the relationship between ribonucleic acid and deoxyribonucleic acid, or DNA. Messenger RNAs get their information from DNA. Transfer RNAs translate information from messenger RNAs into the amino acid sequence, which is protein.

Better understanding of DNA and RNA can bring about new controls over birth defects and disease. Cancer cells are believed to result from a kind of "scrambling" of messages. Viruses contain DNA and RNA, so more knowledge of these nucleic acids will help the fight against the many virus diseases.

Assisting Dr. Holley in his important work were Mrs. B. Jean Apgar, George A. Everett and Mrs. Susan H. Merrill, all chemists, and James T. Madison, biochemist, all of the U.S. Plant, Soil and Nutrition Laboratory. Also assisting were Mark Marquisee and John Robert Penswick, graduate students, with Ada Zamir, a postdoctoral fellow. Putting the pieces together was a team job, Dr. Holley said.

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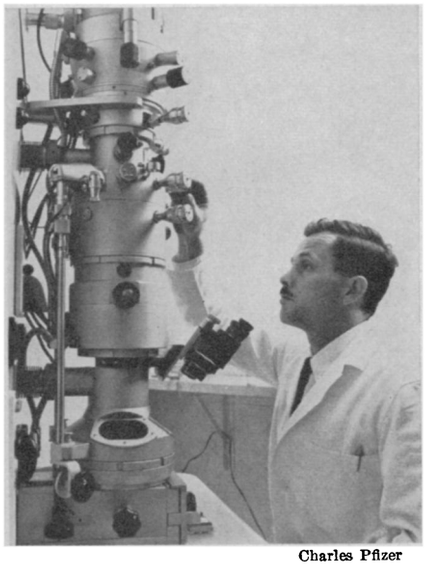

Charles Pfizer

WATCHING VIRUSES—Living infective viruses, some of which are believed to cause cancer, are studied with this electron microscope operated by George Schidlovsky of the John L. Smith Memorial for Cancer Research, Maywood, N.J.

PUBLIC HEALTH

Asian Flu Outbreaks In 22 States Waning

➤ MARCH should see the end of influenza outbreaks, including Asian flu confirmed in cumulative laboratory reports from 22 states, U. S. Public Health Service officials told SCIENCE SERVICE.

One type B influenza case was found in Colorado, but most of the local outbreaks have been in the New England and North Central states. For two or three weeks the total number of deaths from pneumonia or influenza went above the "epidemic threshold" locally. That is, the deaths exceeded normal expectations, but never was the country near the 1962-63 nationwide epidemic.

The Communicable Disease Center's Morbidity and Mortality Report from Atlanta, Ga., for the week ending March 6, said that outbreaks had been scattered and localized in most states.

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SURGERY

Cadaver Transplants Seen

➤ KIDNEYS taken from bodies of persons more than 60 years of age soon after death promise a good supply for transplants to younger people.

Although much work remains to be done before the immunity problem is overcome, the cadaver source of supply should eventually be useful. (Forecast by SCIENCE SERVICE in 1963.) So far, most patients reject the transplant sooner or later, and a two-year survival is considered an excellent result.

It is possible that a sizable percentage of elderly persons have healthy, transplantable kidneys when they die, Drs. Norman Ende and Charles F. Zukoski of Nashville, Tenn., reported in the Journal of the American Medical Association. Such transplants must have the legal approval of the family.

A survey of 50 autopsies they performed shows that approximately 34% of the cases had healthy, transplantable kidneys, and 31 were over 60 when they died. These findings are higher than earlier estimates.

Data obtained from life insurance companies, the doctors pointed out, indicate that men in good health at the age of 60 have only six chances in 1,000 of dying from kidney disease in the following 20 years.

The only other successful source of kidneys has been living persons, who not only must undergo surgery for kidney removal, but run the risk of later disease in the remaining kidney.

How long transplanted cadaver kidneys from older persons will function in their younger hosts remains to be determined, the physicians said.

Of five persons who received donor kidneys from patients after they died in a Veterans Administration hospital, three are alive after 6, 12 and 14 months. The other two died, the physicians say, but complications other than kidney compatibility may have caused their deaths.

Careful autopsy procedure is necessary to be sure the "old" kidneys are suitable for transplant. Acute and immediate clinical value can be found in an autopsy, which often has been restricted to the role of a teaching and research tool, the investigators said.

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