

BIOLOGY-MEDICINE-CHEMISTRY

# Border Between the Living And Non-Living Is Now Erased

## Prize-Winning Research Demonstrates That Inanimate Chemical Molecules Can Cause Disease and Act Alive

**E**RASING the border line between the living and the non-living, and listing inanimate chemical molecules of protein as infectious disease-producing agents along with living organisms, such as bacteria, fungi, and protozoa, the researches of Dr. W. M. Stanley of the Rockefeller Institute for Medical Research, reported to the American Association for the Advancement of Science here, promise to open a new chapter not alone in medicine but in biology.

It is new knowledge which the future may well prove as important as some of the pioneer work of Pasteur, Koch and other science immortals, and is given deserved recognition in the award of the thousand-dollar prize of the American Association for the Advancement of Science for an outstanding paper presented before the Atlantic City meeting. Dr. Stanley's research has far-reaching possibilities and breaks down the already battered walls between physics, biology, medicine and chemistry.

"What I like about my research," said Dr. Stanley in commenting on his paper, "is that it is neither physics, nor medicine, nor biology, but on the borderline of all these."

Incidentally, Dr. Stanley was made very uncomfortable during the week of the meeting by what is probably an invasion of protein molecules. For he had a severe cold. Colds are just one of the many diseases that are caused by viruses, which Dr. Stanley's work on plant ills shows are caused by protein molecules that infect their victims much as though they were living germs.

Dr. Stanley's work demonstrates that what have been called virus diseases are due to infection with just a few molecules of protein. Within the susceptible victim these bits of chemicals multiply enormously as though they were living germs—or rather they force their unwilling host to produce not normal protein but more of the disease-producing sort.

So far Dr. Stanley and his associates have worked only with the virus diseases in plants—tobacco, tomato, spinach and phlox plants with mosaic dis-

eases—but these are considered quite typical. There is every expectation that when some of the virus diseases that cause human ills are studied they will be found to be of the same nature.

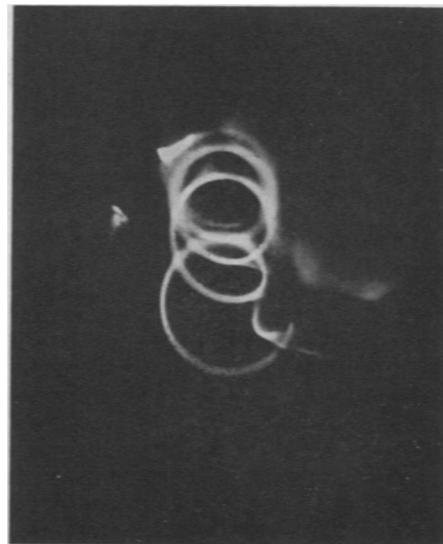
This means that medical science is about to pick up a "hot scent" in its pursuit and attempt at conquest of such devastating ills as infantile paralysis, encephalitis, measles, and perhaps even influenza, common colds, and cancer. And we may discover the unknown cause of smallpox, which nevertheless can be completely controlled by vaccination. All those are considered to be caused by invisible infectious agents called viruses. Hardly less important and damaging are the virus diseases in animals and plants.

The protein non-living "germ" isolated by Dr. Stanley and identified as tobacco mosaic virus is a giant among molecules, weighing seventeen million times the basic hydrogen atom and having a diameter of about thirty-five millimicrons. This means it is almost but not quite large enough to be seen by means of visible light, but is small enough to slide through fine filters used by chemists. Its relatively large size allows it to be concentrated by whirling around in high-speed centrifuges.

Not just one kind of virus protein exists, but many. Dr. Stanley has found different kinds of mosaic plant diseases are caused by different high weight protein molecules. In fact, one kind of disease-causing protein will turn into another. Here is the strange fact that a non-living chemical will, to use a biologist's term, "mutate."

In this there may have been discovered the very mechanism of evolution itself—accidental changes in the chemical molecule being reproduced and perpetuated, giving rise to a new kind of stuff. This repeated many times would make new plants and animals out of old.

In another sense Dr. Stanley suggests that the virus protein molecule is a missing link between chemistry and biology. By virtue of its large size the protein molecule seems to possess sufficient or-



### ATOMIC SKYWRITING

*Atom pathways inside an ultra high frequency radio tube are made visible in special demonstration apparatus exhibited by the RCA Corporation at the meeting of the A.A.S. Pictures were obtained with a special magnetron type radio oscillator tube now being developed for generating radio waves only a meter and a half long. The tube operates in a strong magnetic field so that when electrons come off from the cathode, they spiral several times before reaching their destination at the tube's plate. In the special tube this plate is coated with willemite and a small amount of argon gas was introduced so that impacts of the electrons would create the visible path.*

ganization within its chemical self to reproduce and change—properties regarded as characteristic of living things. Dr. Stanley suggests that it is a bridge between chemical organization within the atom and molecule and biological organization within the living cell.

It is quite possible that science now has its finger upon the essence of life itself or at least the mechanism by which one generation hands it on to the next. The protein molecules have many characteristics of the "gene," the unit of heredity within the germ cell's chromosomes. For instance, that matter of being able to mutate. And the size is about that visualized for the gene. If Dr. Stanley's virus protein turned out to be the gene or even cousin to the gene, this discovery will transcend its possible use in disease treatment.

And this use of virus protein may be just around the corner, for Dr. Stanley finds a virus may be inactivated or made non-disease producing and yet retain its property of giving immunity to disease.

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