BIOLOGY

Artificial Creation of Life May Come From Virus Study

Research Leads to Finding That Treatment Renders Virus Inactive; May Throw Light on Protoplasm

PRODUCTION of life in the laboratory, the dream of modern biologists as the making of gold was the dream of medieval alchemists, may hinge on better understanding of disease viruses like those of smallpox, tobacco mosaic, and hog cholera.

"If we are ever able to synthesize virus proteins in the absence of living cells, then we shall have gone a long way towards the synthesis of protoplasm," declared Dr. W. M. Stanley of the Rockefeller Institute for Medical Research, Princeton, N. J., before a meeting of naturalists in connection with the A.A.A.S. meeting at Indianapolis.

But before that can happen, biologists must first find out how the virus molecules synthesize themselves. These protein units, relatively enormous as molecules go, can invade a cell, take parts of its life-materials, and build up other molecules like themselves. A few of them, introduced into plant or animal, multiply to millions and make the host organism sick unto death.

As yet nobody knows how they do it. Dr. Stanley suggested a possible analogy, in the case of certain complex inorganic compounds capable of forming crystals, yet which do not form them until they are "seeded" with tiny crystals that serve as "patterns" for the process. Perhaps the invading virus molecules serve as patterns in a similar but much more complex process.

Beginning or End

Although the virus molecules are now well established as non-living things, possessed of certain very lifelike characteristics, it is not necessary to look upon them as the lowest beginnings of what might possibly turn into life—as a sort of pre-living or proto-living condition of matter. They may even represent the last stages in the reverse process; may be the ultimate degeneration of life.

When an organism takes to a parasitic mode of living it loses things that it once needed in independent life. Parasitic plants lose their leaves, parasitic insects their wings. The most advanced stage of parasitism in larger organisms comes when all that is left of the organism consists of a set of organs to feed with and a set to breed with. There are some worms like that — the tapeworm, for example.

Dr. Stanley suggested, on the basis of a discussion by a fellow-scientist, that we might think of a one-celled parasite invading the cells of a host plant or animal. It would first lose its cytoplasm, passing on to its host the jobs taken care of by that part of the cell.

Then the nuclear organization might go, finally leaving only large, complex molecules of nucleo-proteins capable of taking material from the host and using it in self-multiplication. That last stage is about a picture of what disease virus molecules now are. They may thus be either at the bottom of life on the way up, or at the top of non-life on the way down.

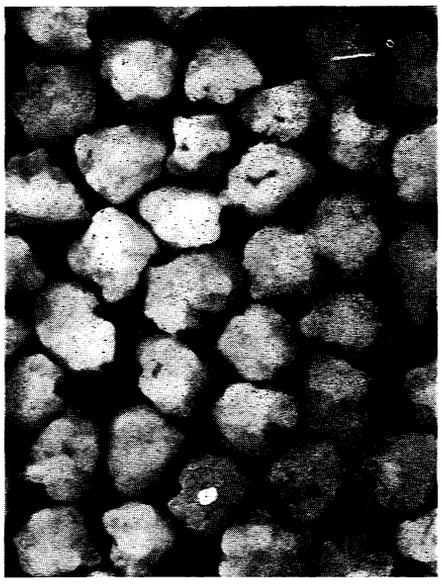
Protection Against Virus?

Hope that men and animals will be protected against the virus diseases, among them encephalitis, infantile paralysis, parrot fever, yellow fever, and certain kinds of cancer, was expressed by Dr. Stanley in another paper.

Dr. Stanley has now extended his pioneer work demonstrating the protein nature of the cause of so-called virus diseases, with two important results:

1. Proteins obtained from virus or mosaic diseases of plants, when treated with hydrogen peroxide, formaldehyde, nitrous acid or ultraviolet light, become inactive. Although slightly altered chemically, they still retain certain chemical and serological properties characteristic of the virus protein. If similar results with viruses affecting man and animals can be obtained, there may be produced material useful in the protection or immunization against such diseases.

2. Intermediate in size and properties between living organisms and non-living molecules, the protein may represent "a type of entity hitherto unrecognized." This means that a new class of matter, neither living nor non-living, may be discovered. Because the protein has the ability to reproduce itself under certain conditions, the understanding of this mechanism may throw light upon the way in which protoplasm, the stuff of life, grows.



X-RAYS INSPECT

It is no longer necessary to bite into a piece of candy to discover a bit of metal that may have been enclosed by mistake. X-ray inspection is used by some candy manufacturers to detect foreign matter, as in this X-ray picture. Notice the white marks portraying unwanted particles in the candy at top right and at the bottom.

Dr. Stanley in his paper before the scientists explained that the tobacco mosaic virus, upon which he has done the most work, is intermediate in size between ordinary molecules and living organisms. It possesses some properties characteristic of molecules and some like those of living things.

To biologists one of the most interesting things about the disease-causing protein-virus is its ability to change into other strains, that is, to mutate as the geneticist says. When the change of strain takes place, the protein of the new strain is different from that of the old virus protein.

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PHARMACY

Coal Tar Yields Narcotic That Rivals Codeine

A NEW pain-killing drug that can be created synthetically from coal tar was reported by Prof. Erich Mosettig of the University of Virginia before the 7th National Organic Chemistry Symposium.

The synthetic drug equals codeine in narcotic effectiveness. Codeine, like mor-

phine, comes from the opium of the poppy flower.

If the persistence of war in the Far East should ultimately interfere with the world's supply of opium for medicinal purposes, it now appears that physicians will not lack for a pain-relieving substitute that can be made in the laboratories of the chemist, from materials that are readily available.

Dr. Mosettig and his co-workers at the University of Virginia are part of a group of medical scientists who are tackling that vastly vital problem of finding an effective pain-killing narcotic that will not be habit-forming. Their work and their goal is the chemists' contribution toward ridding the world of the menace of narcotic drug addiction.

The research is under the guidance of the National Research Council, the U. S. Public Health Service and the Narcotic Bureau of the U. S. Treasury Department.

The drug described by Dr. Mosettig has so far only been tried on experimental laboratory animals. Whether or not it has addiction or habit-forming properties is not yet known and will not be until it is tried out on humans.

Codeine, which the new drug seems to resemble more closely than it does morphine, is less habit forming than morphine. This property of codeine is partly due to its chemical composition and partly because it is more readily soluble than is morphine. Much larger doses of codeine, therefore, must be taken to get the physiological and mental "kick" attained by morphine addicts. All this means that codeine is less desirable from the addict's point of view.

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MEDICINE

Nasal Spraying Seems Best Hope of Preventing Polio

Not Completely Successful at Present, It May Be When Details Are Perfected; Should Lose Smell Sense

NEW research which gives a clue to the mechanism that gives immunity to infantile paralysis and seems to show that spraying of the nose with chemical or other germ-fighting agents will eventually prove the means of preventing this crippling malady was reported at the meetings of the Society of American Bacteriologists.

In actual practice with children, the method has so far not been anything like 100 per cent. successful. But from reports presented, it appears that the method is fundamentally sound and that success is only a matter of perfecting details, such as finding the best substance to spray and the surest way of getting the spray onto the strategic area.

The lining of the nose appears to be the key to the situation. Not only does the virus of the disease enter the body through this lining, but resistance to the virus develops naturally in this lining. This last important point appears from research reported by Drs. Albert B. Sabin and Peter K. Olitsky of the Rockefeller Institute for Medical Research.

They found that when a monkey becomes immune to the disease, as a result of having had one attack, the cells of the membranes that line his nose have antibodies—germ-fighters—that can dispose of the infantile paralysis virus and prevent its getting at the nerves to destroy them and cause paralysis of muscles.

Nasal sprays have been used heretofore with the idea that they could block the passage of the virus by sealing up the membranes. Drs. Sabin and Olitsky investigated this point also, but so far have been unable to discover whether this actually is the case, or whether the chemical of the spray exerts its protective action in some other way.

Of all the chemicals they tested, zinc sulfate was the most effective for protecting monkeys against the disease.

Loss of Smell Important

Loss of the sense of smell after the nose has been sprayed with zinc sulfate is a sign that the spraying has been done thoroughly enough to protect the child or adult against infantile paralysis, Dr. E. W. Schultz of Stanford University pointed out.

Dr. Schultz is leader of one of the research teams that found zinc sulfate nasal sprays effective in protecting monkeys against the disease.

Reason for the failure of the spray to give children as much protection as it does monkeys is because the spraying was not done thoroughly enough, Dr. Schultz believes. The virus which causes infantile paralysis gets into the body through the tiny hair-like endings of the nerve of smell. When these nerve endings are destroyed by chemicals, the virus apparently cannot get through. Destruction of the nerve endings can be detected by testing the sense of smell. When it is lost—scientists call the condition anosmia—Dr. Schultz believes it is a sign that the child is protected against the disease. The loss is only temporary, as the nerve endings regenerate. In children the loss of sense of smell following chemical spraying may last only 3 or 4 days, and in adults it may be lost for a few months. When the sense of smell returns, it is time to spray again, if infantile paralysis is still prevalent in the neighborhood.

Vaccination will not protect against infantile paralysis, Dr. Schultz reported, because vaccination is only effective against germs that get into the blood. The infantile paralysis virus which travels nerve routes rather than the blood route must be fought by chemicals that will strengthen nerve resistance. So far, no way of doing this other than by chemical blockade of the nerve endings with a spray is known.

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CHEMISTRY

Spray Drying Produces Tiny Bubbles of Milk

THE NEW methods of spray drying, which is used for milk, eggs, soap, potato flour or blood, were described at the 4th Chemical Engineering Symposium held at the University of Pennsylvania.

If you have ever used any of these dried products you may have noticed that they may come in the form of tiny, dried bubbles which are light and hollow inside. It is spray drying which produces this unsual form. Additional solubility attained when one wants to put the dried product back into an edible or usable form is a merit of the method.

Ben B. Fogler and Robert V. Kleinschmidt of Arthur D. Little, Inc., described new techniques. It takes only from 15 to 30 seconds for little liquid bubbles of the material to be dried into hollow spheres, they indicated. Great towers, sometimes two stories high, are employed. The sprayed solution comes in the top of the tower and drops by gravity during the drying.

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