MEDICINE

'Flu Virus Revealed

Stripped From Larger, Camouflaging Cell, 'Flu Germ Measured and Analyzed, May Soon Be Conquered

By JANE STAFFORD

IF THE widely expected influenza epidemic of the present war holds off a little longer, scientists may actually be ready for it.

They have at last put the finger on the 'flu germ itself. With the aid of a giant centrifuge, the germ has been separated from a larger cell which for long had camouflaged it.

This camouflage was so successful that until recently its existence was not even suspected. Because of it, scientists trying to protect people from influenza by vaccination were making their vaccine from material containing only about one-tenth as much influenza virus as they thought they were using.

The camouflaging cells are probably normal components of the mouse lung tissue on which the 'flu germs were grown in the laboratory. They were themselves extremely small—too small to be seen with powerful microscopes ordinarily used, and small enough to pass through the pores of fine-grained porcelain filters. But the 'flu germ, or the particles that make up the influenza virus, are still smaller.

Their size could not be estimated until recently. Now, with the aid of the electron microscope, scientists are able to see what they look like and measure them. They are among the smallest of disease-causing agents. Placed side by side enough of these spherical particles to give influenza to about 500 mice would stretch across the period at the end of this sentence.

How It Was Done

Stripping the unsuspected camouflage from the influenza virus particles was done by growing the virus on developing hen's eggs instead of on a preparation of mouse lung tissue. The extra-embryonic fluids from the infected eggs were put into a centrifuge like a cream separator, only much more powerful. This centrifuge subjected the fluids to a pull of 90,000 times that of gravity. After a few hours of this, the influenza virus particles were all pulled out of the fluid and forced to settle to the bottom in a sediment.

From this material, scientists have made a new vaccine. They hope it will be powerful enough to protect you from influenza the way you can now be protected from smallpox by vaccination.

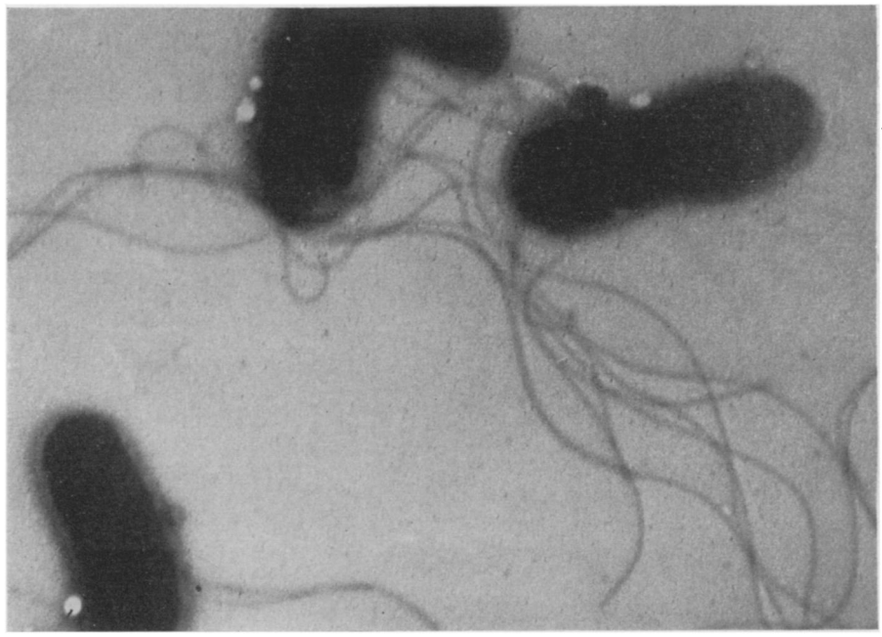
This new influenza vaccination is now being tried on several hundred volunteers. It will be some time before its ability, if any, to confer resistance to influenza is known.

Vaccination against influenza was hopefully tried during last winter's epidemic, using the virus which scientists previously believed was the true influenza virus. Among several thousand people so vaccinated, influenza was 50 per cent less than among the unvaccinated population of the same institutions. The best this or any then conceivable vaccination could do, it seemed, was to raise the 'flu-fighting antibodies in the blood of susceptible persons to the normal level. The level of these antibodies in your blood is related to the degree of resistance you have to the disease, but even a person with a high antibody level sometimes gets influenza.

The newest material for influenza vaccination will, it is hoped, step up your resistance to the disease above the present normal. First inkling of what it can do will come when the vaccinated volunteers have their antibody level read.

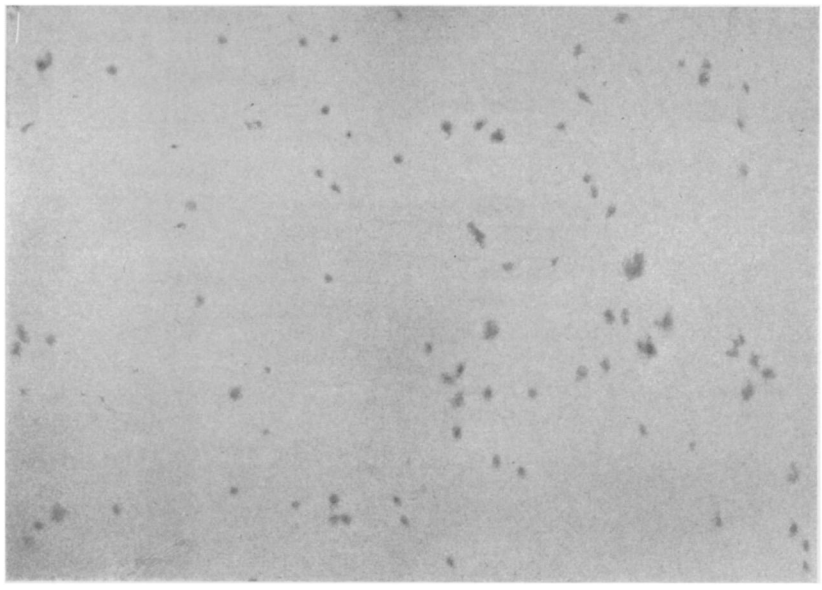
Scientists, however, now have more than one string to their bow for fighting influenza. The same scientists at the University of Pennsylvania, Dr. Leslie A. Chambers and Dr. Werner Henle, who have shown the world with the electron microscope what the 'flu germ really is, have also started analyzing it to find what it is made of. So far, they find it consists largely, if not entirely, of nucleoprotein. This is a general name for a class of chemicals found in the nucleus of cells.

They are complex substances, combinations of nucleic acid with simple proteins. Chemists have been trying to produce a drug that will cure influenza as the sulfa drugs cure certain other germ diseases. So far they have been unsuccessful, but they may now have a better chance. They may, for example, be able to find a chemical which will split off the part



BY CONTRAST

The typhoid fever germ, shown here enlarged only 25,000 times, appears enormous compared with the much greater magnification of the influenza germ on page 409.



SMALL BUT MIGHTY

Here, at last, is the influenza germ itself. But this agent of suffering and death is far smaller than the tiny particles barely visible in this picture. They are shown here magnified 65,000 times their actual size.

of the influenza nucleoprotein that makes you sick. Or they may find a chemical that will change the way the 'flu nucleoprotein is put together so that it loses its ability to cause sickness. Such a chemical could perhaps be used like a drug to treat influenza patients and speed them to recovery.

Human noses may provide still another line of attack on influenza. The nose is equipped with a mechanism for defense against foreign invaders, whether they be disease-causing germs or bits of dust. Besides this general defense mechanism, the human nose seems to have a special anti-influenza defense. Secretions from the nose can inactivate the influenza virus, Dr. Thomas Francis, Jr., of New York University College of Medicine, discovered about a year ago. This ability develops or is sharply increased after an attack of influenza, he finds.

Ability of nasal secretions to stop the influenza virus is due, Dr. Francis thinks, to the presence of anti-influenza antibodies like those found in the blood. Further study along this line may add to the knowledge scientists need for conquering influenza.

If influenza strikes before scientists are ready with vaccination to protect against it or a chemical to treat it, human blood might to some extent stem the tide of the epidemic. Suggestion of this possibility appears in the *Lancet,* an English medical journal.

Scientists are attempting to develop the vaccination that gives what is known as active immunization. This means it stimulates the body to produce influenza-fighting antibodies in great numbers whenever it is invaded by the influenza germ. Another way to protect people against germ disease is to give them the antibodies that have been produced in another person's blood by an attack of the disease.

This passive type of immunization against influenza works in animals, Dr. R. M. Taylor, of the Rockefeller Foundation, has found. He was able to protect mice against influenza by dropping into their noses the blood serum of ferrets that had recovered from and were immune to influenza.

The protection thus given does not last long, and there might be some danger in this method. But, the editor of the *Lancet* points out, blood from convalescent influenza patients would be available quite early in an epidemic and methods for testing its potency are known.

Might Sniff Protection

"Even temporary protection of key persons would often be quite worth while," the editorial states. "For instance, as often happens, if father and the children are all down with the 'flu and mother is looking after them, much would be gained if she could be protected during the difficult period by sniffing antibody once or twice a day. . . .

"We may one day be faced with a devastating scourge such as that of 1918-19, with little hope that laboratory studies can provide a remedy in time. Prophylactic application of convalescent serum to the nasal passages might then prove a godsend, capable of being put into effect even by those quite isolated from centrally organized help."

One reason why the *Lancet* editor thinks the laboratory scientists, in spite of their progress in the last 23 years, might not be ready in time for another world-wide 'flu epidemic is that their vaccinations, even if successful, are so far being directed toward only one type of influenza. Just as there are 32 distinct types of pneumonia germs, so there are at least three and maybe more types of influenza viruses. Type A and Type B have been separated from each other and from the unknowns. Type A has caused most of the trouble in recent years, and is the one from which present vaccines are made. If scientists can vaccinate successfully against Type A, they can probably do it against the other types, but it will take time, especially since not all of the others have been isolated and identified.

Unknown in 1918

Scientists have come a long way in their fight against the 'flu germ since this invisible agent of death swept around the world toward the close of the first World War. No one then knew really what the 'flu germ was. A tiny rod-shaped germ found in nose and throat washings and blood from influenza patients was suspected of being the actual culprit and even got a name, Haemophilus influenzae. That turned out to be a false lead.

First real break in the long, discouraging fight came when Dr. C. H. Andrewes, Dr. P. P. Laidlaw and Dr. Wilson Smith in England trapped what seemed to be the influenza germ itself, a virus so small they could not see it under their microscopes but could use it to produce influenza in ferrets.

This, in turn, led to the accidental discovery, by Dr. F. H. Horsfall, Jr., and Dr. E. H. Lennette, of the Rockefeller Foundation, that ferrets which had recovered from attacks of the dog disease, distemper, were immune to influenza. From this came the development of the influenza and distemper viruses into material for vaccinating people against influenza, with some, but not all the success hoped for.

Discovery of the sulfa drugs was another break in the fight against influenza, because, while these drugs are ineffective in cases of 'flu, they can cure the pneumonia that so often followed influenza and delivered the death blow to the victim.