

## BIOPHYSICS

# Study Electricity on Germs For New Light on Disease

## Minute Electric Charges on Bacteria and Their Role In Causing Agglutination Are Subject of Research

**BY** STUDYING tiny electrical charges on bacteria, so minute that they can be measured only with difficulty, medical science is learning what brings about reactions between disease organisms and the body tissues. In particular, the role of "germ electricity" in bringing about the process of agglutination, by which the body fights disease, is being made known.

Agglutination is the technical term for a clustering or clumping of bacteria under certain conditions which reduces their mobility and activity in the body.

In a report presented before the Electrochemical Society meeting, Dr. Harold A. Abramson, associate in bacteriology at Cornell Medical School, described the small electrical charges which exist on bacteria and all microscopic particles when immersed in a water solution. Such electricity is not a specific property of bacteria alone but is present also on blood cells, fungus cells, yeast cells and even such inert things as quartz dust and oil droplets when they are immersed in an aqueous solution.

It was the existence of tiny electrical charges on oil droplets, when sprayed from an atomizer, that enabled Dr. Robert A. Millikan of California Institute of Technology to measure the fundamental unit of electrical charge—the much-talked-about electron. While Dr. Millikan is now best known to the public for his researches on cosmic rays, he received his greatest award—the Nobel prize in physics—for his work on measuring the charge of the electron.

### Similar Method

Dr. Abramson, using a method somewhat similar to that which Dr. Millikan employed, studies the charges on bacteria. Instead of the charged particles being in air, however, they float in a solution. Their rise and fall, under the influence of an electric field from two plates immersed in the solution, enables him to study the tiny electric charge present.

In an interview Dr. Abramson indicated that the virulent and avirulent forms of the organisms causing diphtheria can be distinguished by the electric charges they possess. Certain forms of streptococcus organisms can likewise be distinguished, and it is now possible to classify the different types of organisms which cause pneumonia by the same electrical method.

In his report to the Society, Dr. Abramson told how estimates were made, for the first time, of the amount of electricity on a typical microscopic organism like colon bacillus or typhoid bacillus. These disease organisms are so small that about 240,000,000 of them would not occupy more than a square inch. His calculations reveal that only about 300,000 electrons form the electrical charges on each organism.

While 300,000 electrons sound like a large amount of electricity, the electron is a very small unit. Every second an electric light in the home burns, it is using electrons by the millions and billions. So minute is the amount of electricity that despite the extreme small size

of the bacteria the electrical charge occupies only about one per cent. of the area.

In a study of the surface electricity of organisms Dr. Abramson found that when agglutination occurs there is still electricity present. Previously-held theories indicated that when the bacteria came together in agglutination the electric charge on the surfaces was neutralized and lost.

The study of surface electricity on bacteria is important, Dr. Abramson said, because the organisms are so small it is hard to measure anything about them. Accurate determination of the electric charge is one of the few ways they may be studied.

*Science News Letter, October 13, 1934*

## PHYSIOLOGY

## Thymus Gland Treatment Hastens Growth of Rats

**W**HAT happens if thymus gland extract is injected generation after generation is shown in the photograph of two rats, shown on this page. The little rat is 8 days old and weighs 11 grams. This is normal. The big rat is only 7 days old yet it is 37 grams in weight, over three times normal weight.

The big rat, his parents, grandparents, greatgrandparents, and other ancestors through seven generations, were treated with thymus extract by Drs. L. G. Rowntree and J. H. Clark of the Philadelphia Institute for Medical Research. The extract (*Turn to Page 238*)



### CAN YOU TELL WHICH IS OLDER?

*The infant rat on the left is a normal one, aged 8 days. The other is one day younger but weighs three times as much. The precocity is the result of thymus treatment.*