

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

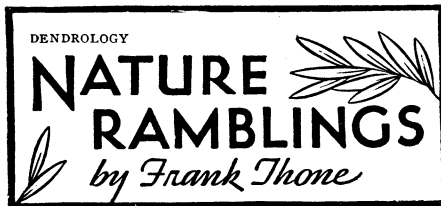
WHAT happens if thymus gland extract is injected generation after generation is shown in the photograph of two rats, shown on this page. The little rat is 8 days old and weighs 11 grams. This is normal. The big rat is only 7 days old yet it is 37 grams in weight, over three times normal weight.

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.



On Their Own Roots

HOW FEW people really do their Christmas shopping early!

To be sure, there are always a certain number of thrifty and foresighted housewives (and their price is above rubies!) who shrewdly do a little Christmas shopping all year through. Their gift-list is always in the backs of their minds, and when they see something that would be especially appropriate for Cousin Mehitabel or Uncle Adonijah they buy it at once, be the month July or October, and store it away until the appropriate time.

You can not be quite so forethoughtful in shopping for your Christmas trees, but it should be easily possible to start looking around, when an autumnal Sunday afternoon drive in the country takes you past a nursery, for a choice little evergreen to be set in a tub of earth, so that it may have leisure to become acclimated before the deep snow flies. By doing such early Christmas-tree shopping in October, you can get the choicest of all Christmas trees, a really living tree, with its roots still on it, not

doomed to die miserably and shed its needles all over the floor before the holidays have ended.

Such a permanent Christmas tree, which can be pot-sunk in your yard and taken up for holiday use year after year, growing up with the children, really has much more of the ancient Yule symbolism about it than one that has been chopped off at the roots and must presently be thrown on the rubbish-heap and ignominiously carted off to the city dump, or burned. For to our north-European ancestors, even while they were still pagans, the use of evergreen decoration during the midwinter festival, the persistent life-color of spruce and mistletoe and holly, defiant of the death-white of the snow, was a promise that the weak, far-retreated sun would soon strengthen and begin to come back again.

When the Irish and Latin missionaries began their great drive into the still-pagan parts of Germany during the early middle ages, they wisely left many of the popular observances alone, especially when their significance blended well with the new doctrines they brought. Christianity was built around the personality of One who proclaimed himself "the resurrection and the life;" here was a native symbol ready to their hand, as the shamrock had been to St. Patrick's.

The boldest of all of them. Wynfrith or Boniface, with an ax cut down the Wotan-Oak, though he paid for it later by being himself cut down with a sword. But he never laid ax to the root of the Christmas tree.

Would it not be well if we modern "heathens" should spare, at least so far as we can, that in which even the most militant of Christians could see no harm?

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was developed by Dr. A. M. Hanson of Faribault, Minn.

Thymus extract given to the parents accelerates the rate of growth and development in the young rats, these investigators found. The precocity is evident in increased birth weight, earlier eruption of teeth, appearance of fur, opening of the eyes and sexual development. The acceleration accrues in succeeding generations of rats born to thymus-treated parents. Giants do not result, however; the animals just grow up much faster than normal.

Starting with a small colony in June, 1933, the investigation has now reached the seventh generation. Moving pictures of the rats, showing their precocity as compared with controls of the same age and descended from the same original colony, were shown at the meeting of the American Hospital Association in Philadelphia.

Science News Letter, October 13, 1934

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

OF SCIENCE NEWS LETTER published weekly at Baltimore, Md., for Oct. 1, 1934.
Washington
District of Columbia } ss.

Before me, a Notary Public in and for the District of Columbia aforesaid, personally appeared Watson Davis, who, having been duly sworn according to law, deposes and says that he is the Editor of the SCIENCE NEWS LETTER and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Editor, Watson Davis, 21st and Constitution Ave., Washington, D. C.

2. That the owner is:
Science Service, Inc., 21st and Constitution Ave., Washington, D. C., a non-profit corporation without stock, operating as the Institution for the Popularization of Science.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Watson Davis,
Editor.

Sworn to and subscribed before me this 18th day of Sept., 1934.

[SEAL]

Charles L. Wade.
(My commission expires March 26, 1938.)

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