

A THEORY OF ACTIVE AND PASSIVE IMMUNITY FROM THE BACTERIA OF CHOLERA, TYPHOID FEVER, AND THE LIKE.

The various theories of immunity have been occupying the periodical medical press extensively for several years. They bid fair to be settled soon on experimental lines. We reproduce the conclusions of Max Gruber, of Vienna, which have been communicated to *The Lancet* of October 9, 1897, by H. E. Durham. Both of these investigators have been employed upon this work for the past eighteen months.

1. A high degree of long persisting immunity can be obtained by means of intraperitoneal injections (in guinea-pigs) of microbes killed either by chloroform or by exposure to a temperature of 60° C. Such killed cultures of cholera, and other vibrios, of typhoid, and coli bacilli, etc., have little or no poisonous properties; the guinea-pigs show trifling symptoms in the course of treatment; they recover rapidly, even when such large doses as 0.5 gramme per one kilogramme are eventually exhibited. The only constant symptoms arising from these injections are to be attributed to the peritonitis, which is caused by the proteins of the bacteria. It follows from these facts that the dead bodies of the bacteria are not poisonous in themselves; and, furthermore, that the immunizing constituents of the bacteria are not identical with the bacterial toxins.

2. The animals, when immunized by this method against the above-named bacteria, are truly infection proof, but they are by no means toxin proof. At the present time we are not dealing with toxin proof immunity, and we are far from saying that animals cannot be rendered proof against the toxins of the above-named bacteria by the use of suitable methods.

3. The destruction of the bacteria takes place through the medium of the juices in actively immunized animals as well as in animals which are protected passively by means of the serums of immunized animals. This fact has been correctly observed and emphasized by Pfeiffer. The (polynuclear) phagocytes only play a secondary and comparatively unimportant part in the process.

4. Protective or antagonistic substances (antikörper) are always present in the blood and juices of the immunized animals. They are already formed, and are not suddenly produced at the moment that a further inoculation is given, as has been asserted.

5. Both in actively and in passively immunized animals these substances (antikörper) react directly upon the