

infections, especially those caused by streptococci, pneumococci, and other microbes in the destruction of which phagocytosis is an important factor.

The importance of these researches on the opsonic content of the blood, apart from the light they throw on the obscure question of immunity production, lies in the fact that they afford us rational indications for the treatment of certain of the infectious diseases by the vaccine method, a method which, since Koch's initial work on tuberculin has fallen undeservedly, as it would seem, into disrepute, has been developed almost exclusively by Wright and his pupils in England.

The vaccine usually employed is a culture of the microbe which has been the cause of the infection. The culture is a suspension in salt solution, sterilized by heat at a temperature of 65° — 70°C . Wright has emphasized the necessity of working quantitatively in this branch of therapeutics. For microbes like the staphylococcus, pneumococcus, and *b. typhi*, Wright determines the number of bacteria by mixing definite quantities of normal blood and the emulsion of the culture. A film is then made and stained. The proportion of bacteria to red corpuscles is determined by counting a number of microscopic fields and the bacteria are estimated on the basis that 1 c.cm. of blood contains 5,000 million red corpuscles. In the case of tubercle vaccine the new "bacillus emulsion" of Koch, which is standardized, is a very suitable agent to use.

As a necessary preliminary to treatment the opsonic content of the serum must be determined by the method already referred to. As a rule, this is stated as the "opsonic index." This opsonic index is the result obtained by dividing the number of bacteria taken up per leucocyte in the presence of any given serum by the number taken up per leucocyte in the presence of the serum of a normal individual. To take an example; If the number of staphylococci taken up per leucocyte in the presence of a given serum be 14 and the number taken up per leucocyte in the presence of a normal serum be 20, then 14 divided by 20 gives us 0.7 as the opsonic index of the serum in question. Of course, to obtain a reliable opsonic index it is necessary to know what variations, if any, occur in the opsonic content of the blood in healthy individuals, or at any rate in persons not infected by the particular microbe the phagocytic power against which is to be tested. It has been found by Bulloch and Urwick that in normal individuals the opsonic index lies between 0.8 and 1.2, with an average of 0.97, in the case of the tubercle bacillus, and the same is apparently true of the opsonic index for the staphylococcus.