

With typhoid and colon bacilli the extracts of all organs are capable of binding the complement of the serum, while lymph glands and kidney absorb the immune body as well as complement. Both the complement and immune body for staphylococci are taken up by all organs.

Further experiments showed that leukocytes and bone-marrow extracts from normal animals had practically no influence on the bactericidal action of the serum, but if one used the leukocytes and bone-marrow from an animal which had been inoculated with typhoid bacilli or one of the other types of bacteria and killed during the infection, these extracts showed a definite bactericidal action toward that particular organism with which the animal was inoculated. The activity of these extracts was independent of the serum. The extracts of other organs from the inoculated animals showed the same power of arresting the bactericidal power of the serum, as was seen with the organs from normal animals. On the other hand, agglutinins were not bound by liver, kidney, or bone-marrow cells. The author concludes that the bone-marrow is one of the most important organs in the body, in the protection of the organism against infection.

Trypanosomiasis Expedition to the Congo.—*Memoir XIII. of the Liverpool School of Tropical Medicine* (London, 1904, WILLIAMS and NORGATE) contains seven papers, the result of an expedition sent to the Congo by the Liverpool School of Tropical Medicine to investigate trypanosomiasis. The first two papers are clinical studies of the disease, and consist of the first and second progress reports of DUTTON, TODD, and CHRISTY. Large numbers of cases were studied, blood examinations of several hundred patients, and many experimental inoculations were done. The organism was found to be always the same as that discovered in 1901 by Dutton in Gambia. Out of 1172 patients whose blood was examined, 103 showed the organism, of which number but 57 were previously diagnosed as having the sleeping sickness. The authors divide the cases clinically into three types: (a) cases with no definite symptoms; (b) cases with few symptoms; and (c) fatal cases showing well-marked symptoms, the most notable being fever, lassitude, weakness, and wasting. This latter type is subdivided according to whether they show sleep symptoms or not. Deep or continuous sleep and lethargy, symptoms described as characteristic of sleeping sickness, were not features of the Congo disease as observed by the authors. No definite relation was noted between the temperature and pulse, and the appearance of the parasites in the peripheral circulation. The trypanosomes were repeatedly found in the cerebrospinal fluid, being discovered in 25 of 37 positive cases of sleeping sickness. In 1 case the organism was found in hydrocele fluid.

The clinical aspects of the disease were shown to vary greatly, from the presence of the organism in the blood without symptoms to cases showing much stupor, a very irregular intermittent fever, and great emaciation, followed by death. The duration of the disease the authors have been unable to determine definitely.

The third paper of the series consists of an account by the same authors of the Congo floor maggot, a blood-sucking dipterous larva, found in the Congo Free State, which they encountered during their work upon trypanosomiasis.

CHRISTY's study of the cerebrospinal fluid in sleeping sickness, based

upon 104 lumbar punctures, constitutes the fourth paper. The organism was found in the cerebrospinal fluid in 35 of the 54 positive sleeping sickness cases. It was more often present near the fatal termination of the disease. When present early in the disease, mania and other cerebral symptoms were usually prominent. The trypanosomes may never find their way into the spinal canal, and the commencement of fever or other symptoms is in no way correlated with the entrance of the parasite into the cerebrospinal fluid.

The fifth paper is a preliminary report by THOMAS and LINTON of many animal experiments for comparing the reactions of the trypanosomes of Uganda and Congo Free State sleeping sickness with those of *trypanosoma gambiense* (Dutton). They found no difference in the various strains of organisms, so that the name *gambiense* (Dutton) must be applied to all trypanosomes with which they worked. They were unable to produce any immunity against the infection and found that there was no transmission of immunity to the offspring.

Two cases of trypanosomiasis in Europeans, reported by DUTTON, TODD, and CHRISTY, and supplementary notes upon the tsetse flies, by AUSTEN, in which a revised synopsis of the species of *Glossina* is given, complete the memoir.

Studies in Phagocytosis.—WRIGHT and DOUGLAS (*Lancet*, 1904, vol. ii. p. 1138) first showed that the phagocytic action of leukocytes is dependent upon the action of a substance in the blood plasma, which is necessary to render the bacteria available for phagocytosis. This substance they call "the opsonin."

HEKTOEN and REUDIGER (*Jour. of Infectious Diseases*, 1905, vol. ii. p. 128) have carried the work farther and have studied the action of temperature and of different chemical substances upon these bodies—opsonins—concerned in phagocytosis. They followed Leishman's method of bringing together fluids containing leukocytes and bacterial suspensions, and then counting in stained smears the average number of bacteria taken up by each leukocyte. The experiments of Wright and Douglas were confirmed and were shown to hold for the leukocytes of several species of animals not previously used. The action of the leukocytes of various animals was found to be unequal in their phagocytic powers, and there was a great difference in the amount of the phagocytosis called forth by the various organisms experimented with, the strain of pneumococcus used calling forth practically none. The authors consider that this property may be utilized to separate organisms.

No phagocytosis was observed when leukocytes washed in salt solution were exposed to bacteria that had not been in contact with blood serum, but after bacteria had been digested with normal serum they became "sensitized," and phagocytosis took place even after the bacteria so treated were washed and suspended in normal salt solution. The blood sera from various animals were found to sensitize a non-virulent streptococcus so that it was taken up by human leukocytes. Low temperatures (1° to 4° C.) retarded "sensitization," and the amount of phagocytosis was found to decrease as decreasing amounts of "sensitizing" serum were added.

The experiments of Hektoen and Reudiger show that the serum loses its sensitizing power when heated to between 54° and 60° C. Sensitized streptococci heated to 62° to 63° C. are not taken up by leukocytes