

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

and cannot be resensitized. The authors believe that opsonins, like toxins and complements, possess two groups—haptophore and opsiniferous—which act according to Ehrlich's lateral-chain theory. When various salts and formalin were applied to the mixture of leukocyte-containing fluid and bacterial suspensions, phagocytosis was materially inhibited. This action was further shown to be principally due to the effect of the salts and formalin upon the "sensitizing" serum, while there was no effect produced on the phagocytosis when these chemicals were applied to the leukocytes alone. The authors consider that these chemical substances may neutralize or hinder the opsonins so that they cannot act upon bacteria. They think that antiphagocytic action of this nature may be an important factor in the establishment and progress of those infections where phagocytosis is an important factor in the destruction of the organisms.

Experimental Typhoid Fever.—ATLASSOFF (*Annales de l'Institut Pasteur*, 1904, vol. xviii. p. 701) gives an account of his work upon the experimental production of typhoid fever. He first turned his attention to finding some organism which, growing symbiotically with *B. typhosus*, favored the growth of the latter. This was done by growing typhoid bacilli upon acid media with a variety of other organisms. It was found that the typhoid bacilli would grow on a medium containing a higher percentage of hydrochloric acid if cultivated with *torula rosea*, than with any other of a number of organisms experimented with, and that this organism had a decidedly advantageous effect upon the growth of *B. typhosus*. The growth of *T. rosea* did not lessen the acid reaction of the medium.

The experiments were conducted upon very young rabbits, from seven to fifteen days old, when the intestinal tract is nearly free from bacteria, making it less probable for the typhoid bacilli to encounter antagonistic organisms. Four strains of typhoid bacilli, varying in virulence, were used, and were administered by the mouth together with *T. rosea*. In a second series of control experiments typhoid bacilli alone were used.

Sixteen young rabbits were fed with the mixed culture, 15 of which died; 3 were fed with a pure culture of typhoid bacilli, 2 of which died. Of the 15 rabbits that died after a mixed feeding, all showed hyperæmia and punctate ecchymoses of the mucosa of the intestine, and swelling of Peyer's patches. In the cases dying on the seventh or eighth day after feedings, slight ulcerations of Peyer's patches were found. The typhoid bacillus was recovered from the blood in 12 cases, and less frequently from other organs.

The author considers that he has succeeded in producing an experimental typhoid fever much like that seen in infants, where the ulcers are rarely deep. He thinks that the method of feeding gives much better promise for investigation of the disease than subcutaneous or intraperitoneal inoculation. The organism *torula rosea* is frequently found in the human stomach (about 70 per cent.), and may play a definite rôle in the etiology of typhoid fever.

Lesions of the Aorta in Syphilis.—In Germany the question has been much discussed recently as to whether syphilis produces in the aorta lesions which are typical and characteristic of that disease. A certain