INTRACEREBRAL INJECTION OF ANTITOXIN IN TETANUS.

Dr. D. Semple, Assistant Professor of Pathology, Army Medical School, Netley, in an article published in the *British Medical Journal* of January 7th, 1899, refers to the following facts, the result of a series of experiments on animals, by Roux and Borrel, and verified by himself at Netley, and at the Pasteur Institute at Paris:

1. Tetanus is caused by the absorption of a toxin elaborated by the tetanus bacillus at the site of inoculation. Here the bacilli multiply, and produce a very strong toxin, which, after absorption, is taken up by the cells of the central nervous system, is fixed there, and gives rise to the characteristic spasms

2. Hypodermic injection of the toxin into susceptible animals will cause the disease, though bacilli are not present.

3. The toxin reaches the central nervous system by two paths, one part, directly by the nerves, causing spasms near the seat of injury at an early date. The other part passes to the central nervous system by means of the blood stream, being fixed in the nerve cells. This fixation takes place earlier in the spinal cord than in the higher nerve centres.

4. If tetanus antitoxin be injected hypodermically into a healthy animal, it acquires passive immunity, and can resist subcutaneous or intravenous injection of large doses of tetanus toxin. However, the animal is not immune to a small dose of tetanus toxin injected into the brain substance, but on the contrary it readily develops cerebral tetanus, and dies.

5. An animal suffering from fully developed tetanus cannot be cured by hypodermic injection of tetanus antitoxin. The toxin has already been taken up by the cells of the central nervous system, and these cells do not take up the antitoxin from the blood, and are not influenced by it. In this case the toxin may invade new areas under the false protection of the antidote, nerve cell after nerve cell being involved. On the other hand, animals in the early stage of tetanus can be readily cured by intracerebral injection of a small amount of antitoxin.

Conclusions.—If tetanus is suspected, but symptoms have not appeared, subcutaneous or intravenous injection of antitoxin confers passive immunity, and is a certain preventative. If symptoms have appeared, this is not sufficient to cure or prevent the spread of the disease, for the central nervous elements have not the same affinity for the antitoxin as they have for the toxin. For this reason the antitoxin does not reach the affected nerve cells in the lower centres, and the higher nerve centres, which have not as yet taken up the toxin, are not