tative difference in their action. It is evident from the foregoing statements of various observers that normal blood serum contains substances which act strongly upon bacteria when the latter are introduced into the body. In the case of typhoid baccillus they are able to at least hinder its growth and activity, if not to destroy it. It remains to be seen whether this action is ever exerted outside the body when the serum and the bacilliary culture are brought together in certain proportions.

Before proceeding to recount our own experiments I must refer to some recent observations of Courmont's, as they go to prove that Pfeiffer phenomenon or reaction is not of universal application. Courmont experimented with the serum of nine typhoid patients and found that it invariably gave a positive reaction with cultures of the typhoid bacillus ; but it also reacted with the colon bacillus. sometimes very markedly. It also gave a distinct reaction with cultures of the Loeffler bacillus and of the Staphylococcus pyogenes aureus, but did not affect the Bacillus pyocyaneus or the Streptococcus progenes. The serum of patients affected with diseases other than typhoid fever had no action on the typhoid bacillus. Courmont therefore concludes that a culture of the typhoid bacillus can be used to determine whether or not a given specimen of blood has been taken from patient suffering or convalescing from typhoid fever -the test of Widal-but he also believes that the fact that the serum of a typhoid patient reacts upon a given bacillus does not prove that the latter is the bacillus of typhoid.

There are various ways of performing the test of Widal, but the principle is the same in all. As already indicated, the test consists in adding human blood serum in certain proportions to a recent culture of the typhoid bacillus, and noting the effect upon the motility and arrangement of the bacilli in the mixed fluid. The culture* should be only eighteen to twenty hours old in order to get the best results, the bacilli then being in active motion and the broth free from clumps. When sufficient fresh blood can be obtained to give pure serum for the test, the mixing proportions should be one part of serum to ten of the culture fluid. When dried blood is used, one part of serum to three or four parts of culture gives the best results, in my experience. Whatever proportion is adopted should be adhered to, in order that the resulting reactions may always have the same significance. In most of my work I have used dried blood

^{*}The cultures employed in these experiments were made from laboratory stock cultures which had not been transplanted for some weeks. I note this fact because Dr. Wyatt Johnston has suggested that the false reactions reported by some observers were probably due to the use of stock cultures which had been made active and virulent by frequent (daily) transplantation.