84 (609)

The relation of the fixation reaction to specific precipitation.

By **FREDERICK P. GAY.**

[*University of California.*]

This work represents a continuation of studies on the mechanism of the fixation reaction between a serum and its antiserum begun by the author in 1905. It was shown that this fixation which had been attributed by Gengou to the presence of anti-albuminous sensitizers was apparently produced by the precipitate formed in the serum-anti-serum mixture. A prolific literature has since sprung up engaged principally in establishing the presence or absence of parallelism between fixation and precipitation. The results in either direction are far from conclusive.

In the present work an attempt has been made to settle the question by studying more attentively an instance in which both precipitation and fixation are known to occur, and where one may reasonably be associated with the other. It is found that in addition to the voluminous precipitate which is known to be formed by mixture of an excess of the antiserum with the antigenic serum, there is another precipitate produced with certain individual antisera in the presence of a large excess of antigen. This latter, and we believe newly recognized, zone of precipitation lies above the zone of inhibition produced, as is well known, by the ordinary excess of antigen. The upper zone precipitate differs in its granular appearance and slowness of formation from the lower zone precipitate.

No fixation of alexin occurs as a rule in mixtures representing the inhibition zone and never in presence of the upper-zone precipitate which may, however, equal or exceed in volume a precipitate of the lower zone which produces complete fixation. This fixation in the lower zone precipitate mixture is produced almost invariably by the washed precipitate and not by the supernatant fluid. The latter fluid may, however, in some cases give partial fixation.

It is well recognized that the addition of a small amount of antigen to the formed precipitate will dissolve it. This applies

to the lower zone precipitate only. A solution of the precipitate by this method gives a perfectly clear solution which fixes as well as the formed precipitate. In similar manner solution of the precipitate by traces of acid or of alkali gives a fixing fluid equal in potency to the undissolved precipitate; the latter method is, for technical reasons, less conclusive than the former method of solution.

The conclusion to be drawn from this work is that alexin fixation by a mixture of serum and antiserum is produced by an antigen-antibody complex distinct from precipitinogen-precipitin but usually brought down by the precipitate in its formation in such a way as to give the appearance that the fixation is produced by the precipitate itself. It would seem then that Gengou's original supposition, without direct proof, of anti-albuminous sensitizers more correctly explains this type of the fixation reaction. The best expression of the conditions as they seem to exist would be found, however, in Nicolle's hypothesis who concludes that antisera contain two classes of antibodies, "coagulins" and "lysins," the former, in this particular instance, producing precipitation, and the latter, the fixation reaction.