

time past this method of estimation has been replaced by another proposed by Ehrlich. According to this, the immunising unit is obtained from 1-10th ccm. of a serum which is capable of so neutralizing 9-10th ccm. of normal toxine that the mixture, injected under the skin of a guinea-pig, produces no local phenomena. Doses of 1-10th ccm. of the toxine used by us kills a guinea-pig of 500 gme. in forty-eight hours, and, in the amount mentioned, it is capable of so neutralizing 9-10th ccm. toxine that absolutely no œdema originates in an animal. No local reaction takes place even when 1 ccm. of a mixture containing 1-30th serum is injected. Only when the mixture contains 1-50th serum does a slight œdema originate, in which instance, however, the animal remains alive and well.

The preventive action of the serum is manifested when it is introduced before the toxine. In this case the animal is always resistant when the quantity of the serum corresponds to that of the toxine. For example, it is sufficient for the guinea-pig to have received twelve hours previously 1-100,000th of its weight of serum, in order to be made immune to a dose of toxine which will kill the experiment animals within five days. Given a dose of 1-50,000th serum, they resist the injection of a quantity of diphtheria bacilli which kills the control animals in forty-eight hours. If the toxine is first injected, then greater amounts of serum are required, the later the counteracting injections are employed. After six hours, injections of 1-1,000th are effective, but after twelve hours they are no longer so. On the other hand, after

subcutaneous inoculation of diphtheria bacilli, the counteracting injections are effective, even twelve to eighteen hours after infection. The anti-diphtheritic serum, therefore, does not possess, by long odds, the immunising power of the anti-tetanic serum, which acts preventively even in 1-100,000,000th part, and yet it produces better therapeutic results than the latter.

If an experimental diphtheria of the vulva is produced in a female guinea-pig after a preventive injection of antitoxic serum, the local phenomena decline upon the second day, and the pseudo-membranes are loosened, while in the control animals, the mucous membrane is red and œdematous, the temperature raised and the general condition very bad. On the other hand, if the serum, in doses of 1-10,000 to 1-1,000 of the body weight of the animal is injected after the inoculation of the diphtheria, the pseudo-membranes begin to loosen on the second day, and the animal is healed. If an injection of antitoxic serum is first given to a rabbit and then a diphtheria produced, the infection manifests no perceptible pathological phenomena if the diphtheritic serum is injected in sufficient amounts. Likewise, a well-developed diphtheria is overcome if the serum is injected at the proper time after infection. Regarding diphtheria associated with other bacteria, especially streptococci, the results obtained were less satisfactory; however, he was repeatedly able to save rabbits, which were treated six to eight hours after tracheal infection; but the injections of serum had to be repeated a number of times. In the cases in which the treatment was not begun until twelve hours after infec-