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The Action of Chlorine Compounds on B. Tuberculosis.

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The influence of compounds containing active chlorine on *B. tuberculosis* (strain H-37 obtained through the courtesy of Dr. S. A. Petroff) suspended in tap water has been determined by guinea pig inoculation. This investigation comprises 3 phases: first, a determination of compounds containing active chlorine germicidal to *B. tuberculosis;* secondly, the effective concentration of such compounds; and thirdly, the time of exposure required for compounds containing active chlorine in effective concentration to kill *B. tuberculosis.*

The compounds containing active chlorine were tested in amounts ranging from 10 to 100 parts per million, generally at increments of 10 parts per million. The time of exposure usually ranged from 15 seconds, 30 seconds, 1 minute, 3 minutes and 5 minutes.

The most practical disinfectant in low concentration appears to be chlorine gas in water in a concentration of 30 to 50 parts per million when applied for 5 minutes. Within the limits of investigation, the results are applicable to disinfection of eating and drinking utensils in restaurants, soda fountains, drinking places, etc., where contamination with *B. tuberculosis* is encountered.

Before reaching a final conclusion it will be necessary to investigate the influence compounds containing active chlorine in *B. tuberculosis* present in colloidal suspensions as well as in tap water.

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Serological Studies in Experimental Poliomyelitis.*

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The experiments briefly reported here are based on the observation that serum from poliomyelitic monkeys prevents the precipi-

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tating effect of a gold chloride solution on tissue emulsions, particularly brain and cord extracts, while normal monkey serum apparently lacks this property. The phenomenon depends on observing certain quantitative relations, thus limiting the zone of comparable reactions to a definite experimental range. The stabilizing property of the immune serum, which is acquired comparatively early in the disease and tends to diminish somewhat in convalescence, is evidently an expression of the acute infectious process. Since the antigen in the test need not be specific, we have no way of telling whether the reaction is limited to the poliomyelitic infection exclusively. Control tests with sera obtained from monkeys inoculated with normal brain and cord and from monkeys subjected to extensive intradermal inoculation with vaccinia virus, so far have been negative.

The technique adopted after numerous variations tentatively as final, is briefly as follows: Three test tubes are filled each with 1.5 cc. of the supernatant of a centrifuged 5% monkey brain-cord emulsion. 0.2 cc., 0.15 cc. and 0.1 cc. of serum are added to the respective tubes, the volume in each tube then being equalized to a total volume of 2 cc. by the addition of corresponding amounts of 0.4% salt solution. Saline of the same strength is used in preparing the tissue emulsion. After 1 hour's contact, 0.075 cc. of a 1% gold chloride solution is added to each tube, care being taken to ensure an even mixture of all ingredients. After standing at room temperature for one hour the results are recorded. The test is profitably read again next morning.

In examining a total of 66 poliomyelitis sera from all stages of the disease and a total of 23 normal sera with this method, we have found the test readily allows a reliable distinction between normal monkey sera and poliomyelitis immune sera as evidenced by the following table.

TABLE I.

Results of stabilization test with monkey sera.

Total number of sera examined	Negative	Intermediate	Positive
66 poliomyelitis sera	0	12 (18.2%)	54 (81.8%)
23 normal sera	18 (78.2%)	5 (21.8%)	0

Code: Negative = complete or almost complete precipitation in the first two tubes.
Positive = complete or almost complete stabilization in the first two tubes.
Intermediate = partial precipitation in the first two tubes.

We have had occasion to follow the serum reaction in the same animal before and after infection in 10 instances. In all cases there

was the characteristic change of the serum reaction, occurring occasionally as early as the second day of the disease and increasing in strength as the intensity of the symptoms progressed. The question naturally presents itself as to the mechanism of the phenomenon. Is it an antigen-antibody reaction? Or are we merely dealing with an incidental unspecific increase in the protective colloidal properties of the serum, strangely characteristic for the poliomyelitic infection? We can offer no illuminating information as yet on that point. From the data on hand, we believe the serum change to be independent of a simple increase in serum globulins. In one case, we have succeeded in removing the stabilizing property of the immune serum after contact with virus cord, the serum after absorption reacting like a normal serum. It appears that the lipoidal substances in the nervous substance play the essential part in the antigen since fair results may also be obtained by substituting an alcoholic brain extract, diluted in suitable proportions for the watery emulsion. The stabilizing property of the immune serum was not destroyed by heating to 65° C. for ½ hour.

Human sera examined with the test show in the vast majority of cases the reaction of the poliomyelitis immune monkey serum, only 4% lacking stabilizing properties completely. We have found no relation between the Wassermann reaction and the result of the stabilization test in these sera. A comparison between sera from adults and sera from younger children of the susceptible age groups, although indicating a slightly higher percentage of non-stabilizing sera in the latter, has so far not brought out any really fundamental difference. We have tried to determine by crucial test whether the stabilizing property of the serum may be taken as an index for susceptibility in the human, as is obviously the case in the monkey, by examining a stabilizing and a non-stabilizing human serum for content of viruscidal substances. (0.5 cc. of serum was mixed with 0.5 cc. of virus emulsion and after incubation for 1 hour at 37° C, was left in the icebox overnight, each of the mixtures then being injected intracerebrally into a monkey.) While one experiment carried out so far seems to support such an hypothesis, further work must be done before we are in a position to draw more definite conclusions.