

experimental method, with the discovery of certain sources of error not usually taken into account in serological work.

The first source of error is the possibility of there being marked changes in the chemical composition of serological substances as a result of changes in concentration. The bactericidal substance with which I was working is fairly stable. It can be heated to 60° C. for an hour without loss of bactericidal power and can be stored in the ice chest for weeks with but slight deterioration. The substance can be passed through a series of chemical manipulations, involving such processes as salting-out, dialyzing, evaporating to dryness, and redissolving, and can be recovered quantitatively from the final product of such manipulations, provided the volume of fluid in which it is dissolved is at no time allowed to increase much above the original volume from which the substance was obtained. If the volume is allowed at any stage to materially increase, there is brought about a rapid deterioration of the bactericidal substance at that stage, giving a final product without bactericidal action.

The second source of error is the possibility of there being marked changes in the specific properties of serological substances as a result of variations in the amount of sodium chloride with which they are mixed. The purified bactericidal substance from horse leucocytes, dissolved in distilled water, has about half the bactericidal power of the initial crude product. If dissolved in physiological saline solution, instead of in distilled water, it is without bactericidal power.

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The relation of the virulence of the tubercle bacillus to its persistence in the circulation.

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It seems as if the tubercle bacillus offered an exceptional opportunity to study the question presented in the title of this study. As is well known, one type of the bacillus, namely, the human type, is non virulent for the rabbit, whereas the bovine type causes

a general tuberculosis in this animal. Accordingly experiments were instituted in the following manner: four rabbits were injected for each test, two with a human type of bacillus, the other two with the bovine type, in each case 1/100 mg. and 1 mg. of a culture being injected into the ear vein. These four animals were bled one half hour, one hour, two hours, and three hours after injection, 5 cu. cm. being caught in a solution of sodium citrate. There were thus eight specimens taken from the two rabbits inoculated with the human tubercle bacillus, and eight from the two inoculated with the bovine bacillus. These sixteen specimens were injected into as many guinea-pigs, and after six weeks these animals were examined for tuberculosis.

In all, six experiments of this description were successfully carried out, using twenty-four rabbits and 112 pigs. In the tuberculosis test, 44 of the pigs injected with "bovine blood" survived, 26 of these, that is, 69 per cent., were found tuberculous. Of 45 of those injected with the human virus 7 developed tuberculosis, that is, about 18½ per cent. In almost all of these experiments the bovine bacillus was found more frequently in the circulation than the human type of bacillus. This was not the case to any great extent in two of the experiments, where the bovine strain was not of marked virulence.

The conclusion is, therefore, that a certain parallelism exists between the virulence of the tubercle bacillus and its persistence in the circulation of the rabbit. The more virulent bovine organism remains in the circulation more constantly and for a longer period than the less virulent human type. The cause of this difference is being studied at present. Perhaps we can generalize from this fact in the case of other microorganisms.

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On indican in the blood of uremic patients.

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A demonstration of the constant presence in uremic blood of an abnormal aromatic body such as indican would be highly signifi-