

killed cultures and filtrates in amounts ranging from 0.5 to 2.0 cc. All of the animals showed symptoms of dyspnea and many showed prostration and death. The filtrates from the 6 hour cultures were much more toxic than those from older cultures.

Human subjects were fed amounts varying from 20 cc. to 340 cc. of heat killed cultures or filtrates. No symptoms developed in any instance. In order to obtain a freshly isolated strain we injected 2 cc. of a veal infusion broth culture of Ae411 into the gall bladder of a *Macacus rhesus* monkey. The animal died after 8 days and the organism was recovered from the gall bladder. This strain was grown in beef heart dextrose medium for 10 days. One hundred cc. of the culture, after boiling for 20 minutes, was then fed to a human subject. No symptoms developed in this individual. Fecal examinations for members of the paratyphoid group of organisms were made on all of our subjects and in no case were we able to isolate paratyphoid organisms. Twenty of the 24 human subjects had been previously vaccinated for typhoid; the remaining 4 had never been vaccinated. Macroscopic agglutination tests were made, using the serum of the human subjects against the homologous organisms which they were fed. These tests were made before feeding and 10 days after feeding. In no case were the agglutination titres increased after feeding.

*Conclusions:* Heat killed dextrose beef heart cultures and filtrates of 5 strains of *B. aertrycke* and 4 strains of *B. enteritidis* when fed to adults on an empty stomach failed to produce symptoms of paratyphoid intoxication. No agglutinins for the homologous strains were present in the serum of these subjects 10 days after feeding.

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### A Peculiar Reaction (Allergic?) to Scarlet Fever Streptococcus Toxin.

MARTIN FROBISHER, JR.

*From the Department of Pathology and Bacteriology, the Johns Hopkins University.*

During the winter of 1925-26 studies on scarlet fever toxin necessitated the frequent intracutaneous injection of various toxic filtrates. The author served as a subject for these tests and until December 9th, 1927, always gave a typical Dick reaction. On this date, however, and on every subsequent test he gave the peculiar, two-phase reaction which is described below. On this occasion there

appeared, within 15 minutes after injection, a raised, firm, whitish or cream colored spot about 2 cm. in diameter with a blotchy red or pink edge, the whole strongly suggesting a serum wheal in an anaphylactic person. This disappeared in about 2 hours. Four hours later the typical, red, Dick reaction began to appear. Five days later a toxin which had been prepared some months previously from a different lot of broth but with the same strain of streptococcus was diluted and injected as usual. This toxin had always previously given a typical Dick reaction, the first signs of which did not begin to appear for 6 to 8 hours after the injection. In this instance, within 2 hours, a diamond shaped wheal, 1.5x2 cm. in size, raised, sharply demarked, tender, itching and so yellow in color as to suggest suppuration appeared. There was little or no erythema. This gradually subsided. Several hours later this was completely over-spread by an intensely red and somewhat swollen area which finally became an oval of 4x6 cm. at the end of 24 hours.

Some of the same material was injected into the shoulder, all previous injections having been made in the flexor surface of the forearm. The reactions obtained were like those previously obtained but were smaller. Their yellow color was no less marked, however. Neither of the 2 lots of sterile broth gave any reaction even when injected undiluted.

Filtrates from other strains of scarlet fever streptococci were tested. Some gave the early, yellow phase (A) and some did not. It was found that the intensity of the "A" phase, but not its time of appearance, seemed to parallel the intensity of the "B" phase. In other words it seemed to parallel the presence of toxin. In this connection the 24 hour growth on 4 agar plates was washed 3 times in saline solution, suspended in broth, heated for 1 hour at 60° C, 0.25% trikresol was added and some of the suspension injected as usual. No reaction occurred. It is recognized that the heating may have changed the bacterial protein immunologically.

It is suggested that this peculiar reaction may represent a state of allergy toward the streptococcus toxin resulting from the repeated injections. In this allergic condition the filtrate appears to elicit an early reaction (A) due to the presence of the foreign protein *per se* and a late reaction (B), (the true Dick reaction) because of its toxic properties. The 2 reactions are quite distinct in appearance and in development time. They still appear with full intensity and have done so upon each injection since first observed. Other persons sensitive to the toxin tested at the same times and with the same filtrates have not been observed to give the (A) reaction. It is suggested that this sort of reaction might give some insight into the rôle of allergy in scarlet fever.