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### Reactions induced by intracutaneous injections of toxins of streptococci from scarlet fever.

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With toxins prepared in this laboratory from a strain of a scarlet fever streptococcus received from Doctor Dochez, no skin reactions were induced in rats, mice, guinea-pigs, kittens, chickens, pigeons, monkeys, sheep or a calf. Questionable reactions were obtained in two young pigs with undiluted toxin and also in four rabbits out of eighteen, the remaining fourteen giving no reactions.

Definite skin reactions, however, have been induced in white goats. All fourteen goats tested gave reactions to the toxin, but individual goats appeared to vary in susceptibility. With ten, definite reactions were obtained with 0.2 cc. of a 1 : 500 dilution of a toxin which gives a reaction in a 1 :1000 dilution in a susceptible human being. Four other goats gave reactions to lower dilutions, varying from 1 :50 to 1 :250. The reactions in goats reached a maximum in 18 to 24 hours and at this stage were usually quite similar to those observed in human beings. In the more susceptible goats according to the potency of the material tested, these reactions varied in degree from slightly reddish areas, 1.5-2 cm. in diameter with no swelling, to large reddish areas from 3-5 cm. in diameter with considerable swelling. All reactions, even the most severe, faded in 48 to 72 hours. With some goats, the darker color of the skin made the readings difficult.

Toxin heated for one hour at 100° C. and uninoculated broth gave no reaction nor was any obtained with toxin neutralized with scarlet fever antitoxic serum, but normal horse serum, even in low dilutions did not neutralize the toxin. Toxins from another strain of streptococcus from scarlet fever, which gave no reaction in susceptible human beings in a 1 : 250 dilution, also induced no reaction in goats, in the same dilution.

Since comparative tests with different toxins indicated that there is a definite relation between skin-test dose of these

toxins for man and for the goat, and since repeated injections of toxin do not appear to interfere with the reaction, these animals should prove of value in the preliminary standardization of the toxin—tests which up to the present have been made on persons.

On the other hand, in attempts to use these animals for standardizing antitoxic horse serums, it was found that after repeated intracutaneous injections, the goats had become so hypersensitive to the foreign protein that further injections resulted in marked local swelling and oedema. Hence, it would probably be impossible to use the same animal for this purpose more than once or twice.

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## The cyanosis of peripheral venous engorgement.

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When the arm is hung down at the side of the body the veins become markedly engorged. Also, there develops a dusky bluish color of the skin of the hand and wrist, extending for a distance up the forearm. Such a state of affairs has usually been assumed to be due to stasis of the blood in the arm.

If the volume flow of blood through the arm is decreased, after a sufficient interval of time, assuming that metabolism progresses normally, there must be a point where the venous oxygen unsaturation is increased above the normal.

In studies using blood taken from the veins on the dorsal surface of the hand, we have found that there is usually a significant decrease of oxygen unsaturation of this blood, when the arm is hung down and immobilized. In eleven experiments, there is a significant decrease of the oxygen unsaturation in six. Of the five remaining, the unsaturation is the same in two cases and decreased in three. In addition, the oxygen capacity of the blood, under these conditions, is usually either increased or remains the same. Of thirteen experiments the capacity is increased in four cases, remains the same in seven and is decreased in two.