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## The production of an exotoxin by certain strains of staphylococcus aureus.

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We have succeeded in demonstrating in sterile filtrates of broth cultures of four out of twenty-one strains of *staphylococcus aureus* isolated from various conditions, a powerful poison with a selective action for the skin. The poison is produced by the growth of these strains in any well buffered broth medium containing only a small amount of glucose. The medium from which our most powerful poisons were obtained was prepared by adding an equal volume of M/15 phosphate buffer solution pH 7.4 to ordinary sugar—free meat infusion broth containing 4 per cent Witte peptone, boiling, filtering and autoclaving. After inoculation with a suitable strain of staphylococcus, the poison can be demonstrated in the sterile Berkefeld filtrates of this broth after 24 hours growth, but our most toxic poisons were obtained after four to six days growth.

The toxicity of the filtrates was tested by intracutaneous inoculation in rabbits. One-tenth cc. of filtrates was inoculated intradermally and at the same time a control of 0.1 cc. of uninoculated broth was always injected in the same rabbit.

The reaction produced by the injection of a toxic filtrate becomes evident from two to six hours after injection as a bluish-purple area of 2 to 5 cm. in diameter, depending on the toxicity of the filtrate. The next day, the purple color assumes a yellow tinge, and there is usually added a deep red zone of 0.5 to 3 cm. surrounding the yellowish area. The circumscribed yellowish area of 3 to 5 cm. becomes progressively yellower—as if necrotic. By the fifth day brown patches appear in the yellow area and increase in size until, at about the twentieth day, the whole lesion has become a dark brown scab. Four to eight weeks later the scab falls off leaving an ulcer. Microscopically the lesions show marked infiltration of polymorphonuclear leucocytes with necrosis of epidermis and underlying corium.

The poison is extremely heat labile, being completely destroyed if heated to 55° C. for one hour. It can be preserved with only slight deterioration for at least two months, if kept in the dark at 4° C.

By intradermal injections of this poison in rabbits, we have been able to produce antiserums which neutralize it in vitro in multiple quantities, and, therefore, conclude that this dermatoxic poison is a true soluble toxin. To date we have found only traces of antitoxin in the serum of rabbits injected intravenously with the toxin.

In a series of eighteen toxin-treated rabbits, it was found that the skin reactivity to the toxin of any one rabbit was inversely proportional to the amount of antitoxin which its serum contained. Normal rabbit serums only occasionally contain any demonstrable antitoxin, and then only in very slight amounts.

By neutralization experiments it has been shown that the toxins from our four active strains are identical.

Lesions microscopically similar to those caused by the toxic filtrates can be produced by intradermal inoculation with young broth or agar cultures.

The size of the lesions of the different strains so inoculated seems correlated with their ability to produce toxin in culture.

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### The germicidal action of milk.

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The so called germicidal action of milk has given rise to much discussion and controversy as to its extent, significance and even its existence. All workers are in agreement that the germicidal effect, if such exists, is only slight in action and transitory in occurrence after the milk is drawn from the animal. Some doubt its existence at all; some believe it to be effective so far as some organisms are concerned but to have no effect upon the typical milk bacteria; others believe in a bactericidal action, but hold that it may occur in the milks of some cows and not in others.