ticular constellation in which urease occurs in amoebocyte tissue of Limulus. These conditions can be altered, if we extract with certain salts, one constituent of which undergoes at once a very firm combination with urease (coenzyme), and they are also modified if we extract with blood serum which contains protein. It might be suggested therefore that, under usual circumstances, enzymes are in stable union, either with constituents of salts or with proteins, which make it impossible for them to form readily other combinations comparable to those into which the urease of amoebocyte tissue of Limulus or its enzyme can enter.

4167

Fate of Skin Bacteria after Autogenous and Heterogenous Transplantation of Skin into Subcutaneous Tissue.*

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(Introduced by Leo Loeb)

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In comparing auto-, homoio- and heterotransplants of various tissues Loeb observed, in general, a greater number of polymorphonuclear leucocytes around or in the transplanted tissues in the last type of transplantation than in the 2 former. The question arose whether the appearance of these leucocytes was due to the presence of bacteria in heterotransplants or whether the leucocytes were attracted directly by the heterotoxins. These observations suggested the following investigations in which we wished to determine (1) what the fate is of bacteria normally present on the skin after transplantation into the subcutaneous tissue, (2) whether in different species the fate of the bacteria after subcutaneous transplantation differs, and (3) whether there is a difference in the fate of bacteria adherent to the skin in case of autogenous and heterogenous transplantation.

We transplanted pieces of ear skin of approximately the same size into pockets of the subcutaneous tissue. Before transplantation the hair of the skin to be used was clipped, but otherwise the skin was left unchanged. In different experiments the pieces were

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left in the subcutaneous pockets 1, 2 or 3 days before they were removed, with precautions which excluded bacterial contamination. We then determined the changes in the total number of bacteria in the transplants and the changes in the various types of bacteria found in the skin. As controls we made determinations of the bacterial flora of the normal ear skin of the animal that served as donor. The methods for the determination of the number of bacteria adherent to the surface of a certain area of skin, do not permit a quantitatively accurate counting of all the microorganisms present; but, inasmuch as the same methods were employed in all cases, approximate results are obtained which allow certain conclusions to be drawn. The animals used were guinea-pigs, rats and rabbits. In each species we studied autotransplants of skin. We also studied heterotransplants from guinea-pigs to rat, from rat to guinea-pig, from rabbit to guinea-pig and from guinea-pig to rabbit.

One hundred and four animals were used in these experiments which served either as donors or hosts or as both donor and host of the skin transplants (26 rabbits, 52 guinea-pigs and 26 rats). In some animals only one piece of ear was transplanted, into others 2 or even 3 pieces were transplanted. The number of skin pieces transplanted and examined bacteriologically was as follows:

I. *Autogenous transplantation* in the rabbit: 27 pieces; in the guinea-pig: 33 pieces; in the rat: 15 pieces.

II. *Heterogenous transplantation:* Rabbit to guinea-pig: 8 pieces; guinea-pig to rabbit: 6 pieces; rat to guinea-pig: 26 pieces; guinea-pig to rat: 19 pieces. In addition, control pieces of skin, of approximately the same size as the transplants were examined in each experiment.

We can at the present time draw the following conclusions: 1. There was a progressive decrease in the number of bacteria found in the transplants on successive days. The large majority of the microorganisms was destroyed within the first 24 hours although in only 1 or 2 instances were entirely sterile plates found after one day. The destruction was still more complete after 48 hours, when nearly 25% of the plates were sterile. After 3 days, sterile plates were found in the majority (62%) of cases, and, in the rest, the number of colonies in the plates was very small. 2. In most instances, staphylococcus was the only survivor after 24 hours, and after 48 hours all the other organisms were destroyed except staphylococcus.

We record provisionally the following observations which, we believe, need further corroboration. 3. We found some deviation

from this typical curve, representing the destruction of bacteria, during the summer months: During the very hot season we found in a number of cases instead of a decrease, a considerable increase in the number of bacteria in the transplants within the first 3 days, in the rat as well as in the guinea-pig. Furthermore, the count of the bacteria living on the normal skin seemed to be higher during the hot weather of the summer than during other seasons. Except for the effect of great heat ordinary variations in temperature did not seem to affect the fate of the bacteria. 4. If we compare the readiness with which the bacteria of the skin are destroyed after subcutaneous transplantation in these 3 types of animals we find the rabbit to be the most effective in this respect, and the rat to be almost as much so, while the guinea-pig destroyed the micro-organisms somewhat less actively than the other species. However, on the whole the curve representing the diminution of bacteria on successive days was similar in these 3 species. 5. It seemed that the destruction of bacteria proceeded more actively after hetero- than after autotransplantation of the skin. We are continuing these experiments.

4168

Erythrocyte Sedimentation Rate of Citrated Blood and Distribution of Plasma Proteins.

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An attempt was made to determine the relationship existing between an increased erythrocyte-sedimentation-rate (ESR) and the quantitative distribution of plasma proteins. In the venous blood of the dog it was observed that a marked increase in the ESR occurs promptly upon the establishment of a sterile abscess produced by subcutaneous administration of turpentine, which is characterized by endogenous tissue absorption. The ESR rapidly returns toward normal upon absorption, or surgical drainage of the exudate. Significant changes in the quantitative distribution of the protein fractions of the plasma were observed, incident to this type of systematic stimulation and appear to have a correlation with the various phases of the rather acute inflammatory process, as is outlined in Table I.