0.3 cc. per kilo subcutaneously, followed on the third day with the same dose intracardially, and the shocking dose, 1 to 2 cc. per kilo, was injected intracardially.

Our results show a decrease in the platelets ranging from 47 to 71 per cent below the normal count, depending on the time at which the samples were taken. The drop is as a rule progressive, becoming more marked as the state of shock continues. In arriving at these figures the shrinkage of the blood volume and consequent relative increase of the cells during shock, was not taken into consideration. Correction for this would show a further reduction in the platelet counts. In the case of non-fatal shock the decline in platelets is not so marked. Two non-sensitized dogs injected with the equivalent amount of horse serum showed no material difference in the platelet count.

2872

Elimination of streptococci in blood stream through the biliary system in the dog.

MARY E. MATHES and EDWIN W. SCHULTZ.

[*From the Department of Bacteriology and Experimental Pathology, Stanford University, California.*]

Streptococci injected into the blood stream of the dog, even in massive doses, are removed from the circulating blood with surprising rapidity. Blood cultures made at short intervals show a precipitous decline from more than ten thousand colonies per cubic centimeter to zero within four to six hours. Examination of the tissues within two or three hours show sparsely scattered cocci in the liver, spleen and lungs. In later examinations the organisms are generally difficult to find. Although the leucocyte count rises appreciably following the injections, sometimes fifty per cent or more within five hours, it is difficult to find cocci in the leucocytes in smears prepared at short intervals during the experiment.

While it cannot be denied that many of the organisms are filtered out in the capillary and sinusoidal beds and picked up by phagocytic cells, especially in the spleen, liver and bone marrow,

as well as phagocyted by the leucocytes in the circulating blood, our attention has been directed to another mechanism which may be important in the removal of the organisms. In cultures made of the urine and bile it was found that while the urine failed to reveal streptococci, the bile generally became positive. The observations were made on dogs which had been subjected to a preliminary laparotomy several days previously, at which time a small glass tube, to which rubber tubing was attached, was securely tied into the gall-bladder. The rubber tubing, about five millimeters in diameter, was brought through the laparotomy opening and the external portion carefully tied off with a number of ligatures. The wound was then closed and the animal returned to the kennels. At the time of the experiment, the bile was aspirated through the tube by means of a seriologic pipette and at about the same interval as the blood cultures were made from the heart. As a rule 0.5 cc. of bile was plated out on blood agar, each sample being taken with a fresh pipette. Hemolytic streptococci were used. The organisms generally appeared in the bile within fifteen minutes, sometimes with only a few colonies per plate, but the numbers rose steadily, occasionally attaining several hundred colonies per cubic centimeter. In one animal in which a final sample was obtained five hours after the injection there were more than 1200 organisms per cubic centimeter of bile. It has recently occurred to us that as an additional precaution we should have performed a preliminary ligation of the cystic artery, although it seems unlikely that the organisms should pass into the bile from this source, at least within the space of a few minutes. According to Herring and Simpson[1] the endothelium of the sinusoids in the liver of the dog is imperfect, being represented by partially detached cells, so that the blood flowing through the sinusoids comes in direct contact with liver cells. Furthermore, the fine branching canaliculi which permeate the liver cell communicate with the surface of the cells abutting on the sinusoids, as is evidenced by the fact that red cells may be found even in normal liver cells and that injecting fluids find their way with great ease from the sinusoids into the substance of the liver cells. It is conceivable therefore that bacteria may enter the liver cell as indicated and be eliminated therefrom by the intra- and thence the intercellular bile canaliculi.

[1] Herring, P. T., and Simpson, S., *Proc. Roy. Soc.*, Lond., 1906, B, lxxviii, 455.