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The concentrating activity of the gall bladder.

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In a previous paper we have noted the fact that the fluid which collects in bile ducts experimentally obstructed is an inspissated, tarry bile when the ducts communicate with the gall-bladder, whereas in ducts unconnected with this viscus the fluid is thin and soon becomes free from pigment and cholates. It has long been recognized that the gall-bladder must have a concentrating function, since bladder bile is more concentrated than duct bile from the same animal; and continued functioning during stasis will explain the tarry bile then found. The inspissation occurs so rapidly as to raise the question whether concentration of the bile in periods of intermittent or partial stasis may not be an important favoring element in the formation of gall-stones.

To determine the rate of concentration advantage has been taken of the arrangement of the hepatic ducts in the dog. There are three of these, which unite to form a common duct, with the cystic duct emptying high up into the central one. Through an opening near the lower end of this last a catheter was pushed into the neck of the gall-bladder, which was emptied and washed with salt solution; and the duct was ligated after the catheter had been withdrawn. The bile from the middle lobes of the liver had now no way of escape save into the gall-bladder. That from the lobes to either side still reached the common duct, but from this it was collected into a rubber balloon placed in the peritoneal cavity. The laparatomy incision was completely closed. The dogs tolerated the operation well. Control experiments in which a second balloon was substituted for the gall-bladder showed that the separated portions of bile differed little in their pigment content, which was taken as the index to concentration.

On examination after twenty-four hours the gall-bladder, still undistended, was regularly found to contain only one sixth to one tenth as much fluid as should on calculation have reached

it, but this, thick and dark, was six to ten times as concentrated in pigment as the control specimen in the rubber balloon. The results were the same when, without other variation in the experiment, the gall-bladder was filled to the normal distension with sterile bile of known character prior to withdrawal of the catheter. The contents of the branches of the hepatic duct connecting with the gall-bladder were always examined at autopsy. Here a thin bile, like that in the balloon, was obtained, a direct proof that the thick contents of the gall-bladder had not come as such from the liver.

It is evident that the normal gall-bladder can concentrate bile with very great rapidity.

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Osmosis as a factor in the local accumulation of leucocytes in the animal body.

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Chemical forces have generally been held responsible for the chemotaxis of leucocytes. Some of the early classical experiments which led to this belief were repeated. The results showed that the work had been misinterpreted, and also indicated that the forces which were active in producing the phenomenon were physical in character.

These physical forces are the forces responsible for osmosis and diffusion. In a solution not at concentration equilibrium they will act in directions counter to each other.

In the aqueous solutions examined, leucocytes are shown to move in the direction of the osmotic force and opposite to the direction of the diffusing substances in solution.

This motion is explained as being due to the greater permeability of leucocytes for water and the fact that their total mass is negligible as compared to their content of water.