100 cc. of urine may be detected. Jaundiced urines examined have contained up to thirty mg. per 100 cc. Normal urine gives an entirely negative test.

The work with this test has not progressed sufficiently to allow any definite conclusions as to its clinical value. The presence of bilirubin in urine has long been used as an index of liver disease. It is known that certain degrees of liver damage can occur without the appearance of bilirubin in urine. In recent years the search is being made for more delicate methods of detecting liver injury. The bile salts are so peculiarly a product of the liver that they deserve a more careful study than has so far been given them.

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The normal and abnormal response of amoeboid cells (amoebocytes of limulus) to stimulation.

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Various considerations suggest very strongly the conclusion that the formation of acid within the amoebocytes is the factor directly responsible for the production of pseudopods and amoeboid movement. It seemed that it might be possible to obtain direct evidence bearing on this problem by allowing substances differing in their chemical and osmotic properties to act on the amoebocytes after the latter have migrated out of the piece of amoebocyte tissue into the surrounding blood plasma of Limulus. However, numerous experiments of this character proved that the amoebocytes respond to stimulation of various kinds with the sending out of normal or abnormal pseudopods and the consecutive movement of the granduloplasm into the latter. The response of these cells does, therefore, not primarily depend upon the character of the external stimulus, but upon the constitution of the cell which is such that it needs to react invariably with certain changes which when taking place in a definite sequence in

a cyclic manner lead to effective amoeboid movement. The amoeboid cell is, therefore, as specifically constituted as the muscle, nerve or gland cell which all react to stimulation of various kinds in their own specific manner.

However, the intensity of the reaction and the character of the movement vary according to the medium which acts on the cells. In general substances which tend to withdraw fluid from the cells and thus increase the viscosity of the protoplasm, call forth the production of thread and sharp tongue pseudopodia, and slow the movement of the exoplasm and granuloplasm, while substances which favor the taking up of fluid on the part of the cells cause the formation of more rounded pseudopods, of drops and balloons, and a more rapid movement of the granuloplasm, which under these conditions tends to fill the balloons more completely. Intermediate reactions of a pendulum character are also observed.

Weak alkali is on the whole more favorable under those conditions to long continued activity of the cells than weak acid. The latter after some time tends to cause a cessation of cell activity, an effect which may be reversible. This result apparently contradicts previous observations made by us which indicated that under experimental conditions differing from those employed in these investigations, acid may favor the outgrowth of the amoebocyte tissue into the surrounding medium. It will be shown in a subsequent publication on which factors the difference in the effects of acid acting upon the cells under different experimental conditions depends.

The most effective medium for the production of multiple thread pseudopodia proved to be a slightly hypertonic solution of $(NH_4)_2CO_3$, while isotonic solutions of this substance tend to call forth the formation of balloon pseudopodia. In general the first effect of the addition of a substance to the amoebocytes consists in the formation of drops and balloon pseudopodia. It seems as if the change of the medium itself acted as a stimulus of so great an intensity that the metabolic changes of a corresponding intensity, produced within the cells, lead to an excess reaction which finds expression in the formation of balloons. When the intensity of the stimulus in the course of time gradually decreases, the viscosity of the cell, or of certain parts of the cell, may increase again and tongue and thread pseudopodia can be produced.