

## 3077

**The influence of ammonium salts on the reaction of the protoplasm of amoebocytes.**

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We have previously<sup>1</sup> shown that amoebocytes of *Limulus* stained with neutral red are a favorable object for the study of the penetration of acid and alkali into the living cells. We found that if a N/1000 HCl solution in N/2 NaCl is allowed to act on stained amoebocytes, the acid penetrates within a minute or two into such cells and causes the granules to give off their stain. After this discolorization has taken place, the cells are still able to carry out amoeboid movements, after the acid has been replaced by a N/1000 NaOH solution in N/2 NaCl. The acid penetrated, therefore, into the living amoebocytes. If we surround amoebocytes, previously stained with neutral red with very dilute isotonic or slightly hypertonic solutions of ammonium carbonate, ammonia, or ammonium phosphate, the red color of the granules changes to yellow, indicating that the  $\text{NH}_4\text{OH}$  ( $\text{NH}_3$ ) has penetrated into the cells and affected the granules. Such cells may likewise still be able to undergo amoeboid movement. However, in some cases droplets within the cell may retain the red stain, indicating that the  $\text{NH}_4\text{OH}$  did not penetrate into these droplets or at least was unable to change their acid reaction. If we now replace the ammonium salts or ammonia by isotonic N/1000 HCl, the acid penetrates into these yellow amoebocytes and decolorizes them. As in our previous observations, we noticed that after the granules have given off their stain, the droplets may retain a red color for some time. This suggests that in the droplets the neutral red is not present in the same state as in the granules. In the latter the stain is probably bound chemically or by adsorption to the surface of the granules, while in the droplets it is apparently dissolved in the fluid.

If instead of using these ammonium salts or ammonia, we use a 0.54 N solution of  $\text{NH}_4\text{Cl}$ , which has an acid reaction, the re-

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<sup>1</sup> Loeb, Leo, and Gilman, E., *Am. J. Physiol.*, 1924, lxxvii, 526.

sults are different. Instead of assuming a yellow color, the cells are decolorized except the droplets which may remain stained red at least for a short time. The cells, into which  $\text{NH}_4\text{Cl}$  has thus penetrated, are still able to carry out amoeboid movements under favorable conditions.  $\text{NH}_4\text{Cl}$  behaves, therefore, in a manner similar to  $\text{HCl}$ ; in both cases the acid entering the cells causes the granules to give off their stain. On the other hand, the amoebocytes differ in their behavior towards  $\text{NH}_4\text{Cl}$  from certain plant cells, into which, according to the observation of Jacobs,  $\text{NH}_4\text{OH}$  ( $\text{NH}_3$ ) penetrates rapidly while the acid remains in the surrounding medium; thus, in an acid solution the interior of the cell assumes an alkaline reaction owing to the much greater power of penetration on the part of ammonia as compared to  $\text{HCl}$  or other inorganic acids (or of the  $\text{H}$  ions). Apparently associated with the delicate structure and lability of the amoebocytes is their great permeability to substances to which many other kinds of cells seem to be impermeable or much less permeable.

## 3078

**Presence of a growth stimulating substance in the yolk of incubated hens' eggs.**

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It has been shown by Burrows<sup>1</sup> that body cells can grow independently only when they are crowded together into narrow stagnant confines. These conditions are important because this growth depends on the accumulation of growth stimulating substance or substances to a certain concentration. This substance or substances has been called the archusia. The cells cannot re-

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<sup>1</sup> Burrows, M. T., and Jorstad, L. H., "On the Source of Vitamin A in Nature" and "On the Source of Vitamin B in Nature." To appear in the *Am. J. Physiol.* in May or June, 1926.