bacillus, coli, proteus, cholera and *Streptococcus hemolyticus, Straphylococcus aureus,* and types of pneumococci. The cultures were examined under parallel conditions in glucose and glucose insulin broths, at the same intervals as were those in the first series. It should be stated that 20 units of insulin were used for every 50 cc. of broth culture. A Lilly preparation, which gave satisfactory clinical reactions, was employed. In every instance the results were negative.

These observations seem to indicate that insulin added to glucose media has no apparent effect either upon the rate or the intensity with which several types of bacteria utilize glucose for energy, as measured by changes in titratable acidity and by changes in hydrogen ion concentration.

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Identification of two types of mononuclear phagocytes in the peripheral blood of rabbits.

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Mallory[1] in 1898 named the mononuclear phagocyte of typhoid fever lesions endothelial leukocytes. Since that time cumulative evidence has given much support to the view that the mononuclear tissue and blood phagocytes arise from endothelium. Aschoff and Kiyono[2] by means of vital dyes traced these free cells to the reticulo-endothelium. Sabin[3] in the chick embryo saw endothelial cells detach themselves from the walls of veins and become free in the lumen of the vessel; and this author,[4] after marking the vascular endothelium by the intravenous injection of carbon in suspension, observed the carbon-laden endothelial cells to un-

[1] Mallory, F. B., *J. Exp. Med.*, 1898, iii, 611.

[2] Aschoff, L., and Kiyono, K., *Folia. Hæmatol.*, 1913, xv, 383.

[3] Sabin, F. R., Contributions to Embryology, 1920, iii, Carnegie Inst. Wash. Pub. No. 272, p. 213.

[4] McJunkin, F. A., *Am. J. Anat.*, 1919, xxv, 27.

dergo mitosis and to separate and assume the same morphology as the free cells.

Recently Sabin, Doan and Cunningham[5] gave the first noteworthy evidence that these phagocytes are not of a single type, by demonstrating in peritoneal exudates with supravital stains a cell with the neutral red granules grouped in the hof of the nucleus in "rosette" form, in distinction to a second type with scattered neutral red granules. The author[6] repeated their experiments and found, in addition to the two types described by them, a third or hyaline type with little affinity for neutral red. Examination by the author of the lymph nodes, spleen and liver, fresh and in paraffin sections with the neutral red mordanted *in situ*, gave evidence which appears to be conclusive that the rosette type of cell first described by Sabin and co-workers, Cunningham and Doan, arises from the reticulo-endothelium of the lymph nodes, while the hyaline type, since it so frequently contains carbon after the intravenous injection of ink, was regarded as a cell derived from the blood vascular endothelium. The cell derived from the lymph vessel endothelium, as well as the one derived from the blood vessel endothelium, was found under certain conditions to present neutral red granules scattered irregularly in the cytoplasm; but the diffuse granulation was found especially in the large young cells and in the actively phagocytic ones of lymph node origin.

The author at an earlier date adopted the term of endothelial leukocyte, which was proposed by Mallory, for the mononuclear phagocytes. Separation of the group into the lymph-endotheliocytes of lymph vascular origin and the hem-endotheliocytes of blood vascular origin now appears to be warranted by sufficient data. The presence of the former in the normal peripheral blood of rabbits is best demonstrated by concentrating the white cells in a leukocytic layer by the centrifugation of a mixture of 3 cc. of blood and 2 cc. of 3.8 per cent sodium citrate. After removal of the citrated plasma, 6 drops of the buffy coat is transferred to 5 cc. of a dilute neutral red solution made by adding 1 part of saline solution saturated with neutral red (Gruebler's) to 19 parts of saline solution. After 10 minutes the mixture is cen-

[5] Sabin, F. R., Doan, C. A., and Cunningham, R. S., PROC. SOC. EXP. BIOL. AND MED., 1924, xxi, 330.

[6] McJunkin, F. A., *Am. J. Path.*, 1925, i.

trifugated, and all the supernatant liquid removed except a volume equal to that of the cells. With platinum loop the cells are placed at the center of a cover-glass rimmed with vaselin which is at once inverted on a slide. The lymph-endotheliocytes with the neutral red in the hof of the nucleus number about 4 per cent. By the intraperitoneal injection of 10 cc. or more of whole rabbit's blood on three or four successive days the number is increased to 6 or 7 per cent.

Hem-endotheliocytes have not been demonstrated in the peripheral blood of normal rabbits. On the intravenous injection of 4 or 5 doses of 5 cc. of India ink at about 5-day intervals, there appears in the peripheral blood, within 24 hours after an injection, a cell identical with the hyaline type observed in the peritoneal exudates. This hem-endotheliocyte is characterized by one or more carbon particles in a clear cytoplasm practically devoid of neutral red. A maximum of 4 per cent has been observed. The appearance and disappearance of these leukocytes is subject to much variation. Three cc. of blood is readily obtained by puncture of marginal ear vein (ear other than the one used for ink injections) of the animal placed head downward in a box. Films on slides may be fixed for 2 hours in a solution consisting of 5 parts of commercial formalin and 95 parts of Zenker's fluid without acetic acid. The fixed films are transferred to 10 per cent formalin for 5 minutes, stained with hematoxylin (Harris without acetic) for 2 minutes, washed for a few seconds, and blotted dry at once. The neutral red is preserved in the cells that react to it.

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The effect of surface active substances on the diffusion of water through membranes.

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According to the investigations of Jacques Loeb,[1] the diffusion of water through membranes is a linear function of the solute,

[1] Loeb, Jacques, *J. Gen. Physiol.*, 1919, ii, 189.