blood sugar into lactic acid during an incubation of 2 hours. Kondo,[6] however, in his experiments on glycolysis in dog's blood during a similar period of incubation found that the increase in lactic acid was much less than the amount of sugar lost. Morgulis and Berkus[7] have reported that the disappearance of the sugar proceeds parallel with a formation of lactic acid. Their figures, however, do not demonstrate this parallelism. Katayama[8] failed to find a production of carbon dioxide as a result of glycolysis.

None of the observers in the literature did demonstrate substances other than lactic acid produced as a result of glycolysis. In our experiments we confirmed the quantitative recovery of lactic acid from the blood sugar during glycolysis.

Summary: The sugar of shed blood gradually decreases on standing without bacterial contamination. The disappearance of the blood sugar is accounted for by the formation of a corresponding amount of lactic acid.

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Reversible Changes in Living Protoplasm.

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It has been shown[1] that when a cell of *Nitella* is cut a wave of some sort, which we may for convenience call a death wave, passes rapidly along the cell and that at each spot it reaches a characteristic death process is brought about. In dilute solutions (*e. g.* 0.001 M KCl) this consists of a sudden change whereby the protoplasm becomes more negative after which its potential difference approaches zero.

These alterations are irreversible but similar changes of a reversible character may occur spontaneously or may be induced by a variety of reagents (both organic and inorganic). After the removal of the reagents the changes often cease at once or after some minutes. Very often these changes are rhythmical and appear to travel along the cell, sometimes at a high rate of speed.

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[6] Kondo, K., *Biochem. Z.*, 1912, xlv, 88.

[7] Morgulis, S., and Berkus, O., *J. Biol. Chem.*, 1925, lxv, 1.

[8] Katayama, I., *J. Lab. and Clin. Med.*, 1926, xii, 239.

[1] Osterhout, W. J. V., and Harris, E. S., *J. Gen. Physiol.*, 1928-29, xii, 167.

During the past 5 years a large number of such cases have been recorded photographically by means of the technique previously described.[2] These are being studied with a view to correlating all the phenomena since, to arrive at a theory of living matter, it is necessary to have accurate observations of its fluctuations under normal conditions. It would seem that such alterations might be due to changes in the permeability of the surface or in resistance elsewhere. Such changes in the surface might be essentially structural (*e. g.*, due to the temporary formation of openings in certain layers) or chemical in nature.

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Predicting Penetration of Dyes into Living Cells by Means of an Artificial System.

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The penetration of dyes into the vacuoles of living cells of *Nitella* and *Valonia* proceeds as though the cell consisted of a non-aqueous layer lying between the external aqueous dye solution and the internal aqueous sap of the vacuole. On this basis it should be possible to predict the relative rate of penetration of dyes into the vacuoles of living cells if we know their rate of diffusion into the "vacuole" of an artificial system representing the 3 phases just mentioned.

To test this an artificial system was constructed consisting of a horizontal glass tube with 3 vertical arms. (1) To the left arm is added the dye solution (identical with the one in which cells are placed, *i. e.* sea water for *Valonia* and buffer solution for *Nitella*); (2) to the central arm is added chloroform (representing the non-aqueous layer of the living cell) until it fills the horizontal portions and the lower part of each upright tube. (3) Upon the chloroform in the right arm is poured some of the sap, artificial or freshly extracted from the living vacuole of *Valonia* or *Nitella* as the case may be (this will be called the artificial "vacuole"). Each one of these 3 phases is stirred by a separate glass stirrer entering through the corresponding upright arm. All the stirrers revolve at a uniform rate. Dye which penetrates into the chloroform at the phase

[2] Osterhout, W. J. V., and Harris, E. S., *J. Gen. Physiol.*, 1927-28, xi, 391, 673.