receiving the aerated fat for 2 weeks. The area above the 1.00 line of the average of these curves was 1.33 sq. in. (C, Fig. 1). Thus the aerated fat had little or no effect on the abnormal R. Q. curves, while the unhydrogenated and hydrogenated fat had a marked and similar effect on these curves.

Conclusion. The partial hydrogenation of the alcohol-soluble fraction of lard, leading to the complete or almost complete destruction of the linoleic acid contained therein, does not diminish the effectiveness of the fat with respect to the lowering of the abnormal respiratory quotients of rats on a fat-deficient diet. Further indication is thereby given that the carbohydrate factor postulated as present in natural fats is not linoleic acid, the lack of which in the diet of rats has been found to produce other deficiency symptoms.

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Penetration of Potassium Into Nitella.

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Experiments with *Valonia macrophysa* indicate that in the light the rate of entrance of potassium is increased when the external concentration of potassium or the external pH is raised above normal, but if they are reduced sufficiently below normal potassium leaves the cells. In the dark the cells fail to grow and potassium does not increase even when the concentration of potassium and the pH are simultaneously increased in the external solution.

These results have been explained by assuming that potassium enters the protoplasm chiefly as KOH, so that the rate of entrance depends on the difference between the ionic activity product [K] [OH] inside and outside.

Similar experiments with *Nitella flexilis* give the following results*: *(a)* The entrance of potassium is relatively rapid in both the dark and the light. *(b)* No growth occurs during the experiments either in the dark or the light, so that the rate of entrance is measured by the increase in the concentration of potassium. *(c)* The rate of increase of potassium is practically independent of the ex-

* The technique resembles that previously described but the analyses were carried out according to the methods of Emich.

ternal pH over the range 5.7 to 8.5. Thus in a typical experiment lasting 8 days the potassium concentration increased 52% at pH 6, 58% at pH 7, and 55% at pH 8. *(d)* The rate of increase of potassium concentration at pH 7 depends on the external potassium concentration at lower concentrations, but this effect practically disappears at higher concentrations. Thus in a typical experiment (lasting 72 hours) when the external concentration of potassium was 0.0001 N the potassium concentration increased 38%, at 0.001 N 86%, and at 0.01 N 92%. *(e)* The internal pH as measured by the glass electrode did not change much from 5.5 during the rapid entrance of potassium. *(f)* The chloride concentration in the sap increases at about the same rate as the potassium concentration. *(g)* It was found that ultrafiltration of the sap (which removes a considerable amount of organic material not thrown out by centrifugalization) does not alter the potassium concentration, so that no appreciable amount of potassium is held in the sap by colloids.

Nitella appears to differ from *Valonia* in that (unless the pH just inside the inner protoplasmic surface of *Nitella* is greater than measurements of the sap as a whole indicate) potassium can enter when the ionic activity product [K] [OH] is greater inside than outside. This requires energy.

In both *Nitella* and *Valonia* the ionic activity product [K] [Cl] is greater inside than outside.

In these experiments the ionic activity product [K] [HCO_3] is in some cases greater outside than inside and it is possible that potassium enters in part in this form. It may also enter in other forms, *e. g.,* as KOH. If KOH reacts with a constituent HX of the protoplasm to form KX which then diffuses into the vacuole (as assumed in previous papers) it is evident that when the amount of HX is limited an increase of potassium or of pH beyond a certain point will produce very little increase in KX and consequently very little increase in the rate of entrance of potassium. Similar reasoning would apply to $KHCO_3$ if it reacted with HX but not if it passed through the protoplasm as $KHCO_3$.