Fig. 1 shows a pair of curves drawn through the plotted data of four pairs of series, each plotted point representing the arithmetic mean of twenty

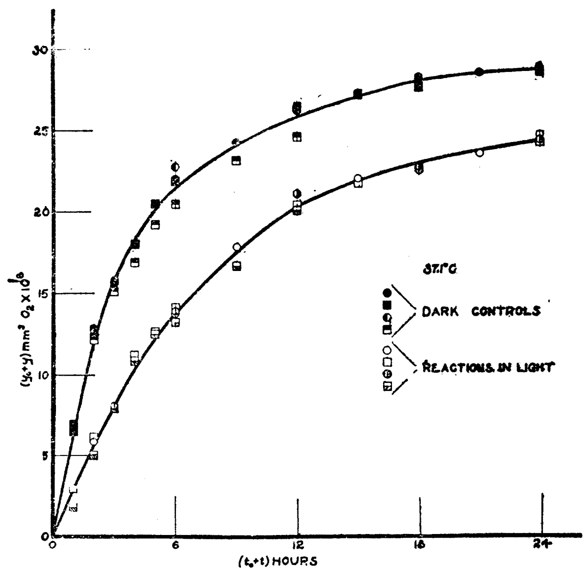

FIG. 1. Curves plotted to data from four series of experiments in distilled water and inorganic salts. Each point represents the arithmetic mean of twenty determinations. t_0 is the time elapsed between the beginning of starvation and the beginning of measurement; similarly, y_0 is the oxygen consumption during the period t_0. Both t_0 and y_0 are presented as unknown.

observations. In from 48 to 72 hours, the oxygen consumption falls off to practically nil, while the total quantity of oxygen consumed is approximately equal in the irradiated series and in the dark controls. At the end of a run, the *Sarcina* were plated out to make a count of viable organisms; the results of the counts indicate either that there had occurred no appreciable number of deaths during the period, or that the number of deaths was compensated by the appearance of an almost equal number of new organisms.

The gradual falling off in the rate of oxygen consumption is of interest, especially since we could attribute it neither to a limitation of oxygen supply nor to an accumulation of metabolites in the suspension medium. Apparently, the only substance excreted into the medium by the cells is carbonic acid; since we could find in it no traces even of fatty acids or of nitrogenous compounds. And, furthermore, if we added small quantities of fatty acids or alcohols, we found either that they did not affect the rate of oxygen consumption and were left in the suspension medium, or that they materially accelerated the rate of oxygen consumption and were taken up by the cells from the medium.

It may be noted that of the four series of data plotted, one describes the oxygen consumption of *S. lutea* in distilled water, one in phosphate buffer[2] (pH 6.5–8.0), one in half normal sodium chloride solution, and the fourth in tenth per cent. potassium cyanide solution. We could as well have plotted the data taken on the oxygen consumption of *S. lutea* in a medium of normal potassium iodide, tenth normal potassium chloride, fiftieth molar ferric chloride, or Ringer solution. The data all lie scattered along the same curves; the effects of the different ions and of the different osmotic pressures being less than the experimental error for any determination, that is, less than 3 per cent. of the mean value of twenty determinations in any other of the suspension media. Similar lack of effect of changing osmotic pressure has been reported by Falk,[3] and is discussed by Beck.[4] Thus, it appears that *S. lutea* is an organism in which the respiration is not responsive to changes in the osmotic pressure of its suspension medium; and furthermore, in which iron catalysis of respiration does not occur[5]—or if it does occur, normally, is not essential for the maintenance of cell oxidations.

By inspection, it is evident that even though the total oxygen consumption turns out to be equal in the two series, the rates of oxygen consumption diverge somewhat widely when the cells are irradiated in one case and in the other when they are shielded from light. Indeed, during the first hour, while there is apparently a quantity of light-sensitive material in the cells, the rate for the dark control (at this temperature—37.1° C.) may be as much as five times that for the irradiated organisms.

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