

## 8592 P

Oxygen Consumption of Peptone Cultures of *Escherichia coli*.

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Recent studies by Martin,<sup>1</sup> Winslow and co-workers<sup>2</sup> and Clifton<sup>3</sup> on the metabolic activities of bacteria indicate that the rate of metabolic activity per cell varies widely at various phases of the growth cycle. The maximal oxygen-consumption, carbon dioxide-production or ferricyanide-reduction per cell per unit time was noted near the end of the lag-period of growth and could only in part be explained by increased cell-size during the same period of growth. Total oxygen-consumption, carbon dioxide-production or ferricyanide-reduction per unit time reached maximal values near the end of the logarithmic period of growth and then decreased rapidly as the age of the cultures increased.

The present paper reports the influence of peptone- and of oxygen-concentration on the oxygen-consumption, as measured by Warburg's technic, of cultures of *Escherichia coli* at 37.5°C. The oxygen-consumption per cell reached maximal values during the latter part of the lag-period, over a wide concentration range of either peptone or of oxygen. The rate of growth increased slightly as the concentration of peptone was increased from 1.0 to 10% while the total crop was increased approximately 4 times. All cultures were inoculated with the same initial numbers of bacteria. The oxygen-consumption of the cultures varied widely with the age of the cultures and with concentrations of peptone or of oxygen. Typical results are reported in Table I.

The amounts of oxygen consumed per milliliter of the cultures

TABLE I.  
Oxygen Consumption of Peptone Cultures of *Esch. coli*.

Age of culture (hours)	2	3	4	5	7	10
Medium	Cu.mm. O <sub>2</sub> consumed/min./ml. of culture					
1.0% peptone (air)	0.65	2.15	2.65	1.20	0.15	0.10
5.0% " "	0.72	2.70	6.00	7.15	6.45	2.20
5.0% " (O <sub>2</sub> )	1.34	3.90	11.57	12.60	1.75	1.10
10.0% " (air)	0.69	2.45	5.80	7.00	7.65	7.00

<sup>1</sup> Martin, D. S., *J. Gen. Physiol.*, 1932, **15**, 691.

<sup>2</sup> Mooney, Grace, and Winslow, C. E. A., *J. Bact.*, 1935, **30**, 427.

<sup>3</sup> Clifton, C. E., Cleary, J. P., and Beard, P. J., *J. Bact.*, 1934, **28**, 541; Clifton, C. E., and Cleary, J. P., *J. Bact.*, 1934, **28**, 561.

during the first 10 hours were approximately 430 cu. mm. in 1.0% peptone, 2400 cu. mm. in 5% and 3300 cu. mm. in 10% peptone cultures of *Esch. coli*. A marked immediate increase in oxygen-consumption was observed in 24-hour cultures in 1.0% peptone following the addition of small amounts of concentrated solutions of peptone. This suggests that the decrease in metabolic activities observed as the age of a culture increased was due in part to exhaustion of available food. This suggestion is further supported by the observation that no marked growth or oxygen-consumption was observed under the conditions of these tests when filtrates (adjusted to pH 7.2) of 24 hour or older, 1.0% peptone cultures of *Esch. coli* were lightly seeded with this test-organism. Rapid growth and marked oxygen-consumption was noted under the same conditions when 0.1 milliliter of 10% peptone was added per 0.9 milliliter of the filtrates. These results support the previous observations of Clifton<sup>3</sup> on the closely connected rôles played by the concentrations of foodstuffs, oxidant, and organisms in controlling the metabolic activities of bacteria and indicate that these factors must be considered in any interpretation of the different rates of metabolic activity observed during the growth-cycle of bacteria.

### 8593 P

#### Calcium Involvement in Magnesium Deficiency.\*

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The existence of an intimate relationship between the metabolism of calcium and magnesium in the animal body has long been postulated. In harmony with this hypothesis the writers have accumulated considerable evidence which points to a calcium involvement in the syndrome of magnesium deficiency.

Certain aspects of such an involvement have already been pointed out by Kruse, Schmidt and McCollum<sup>1</sup> and by Orent, Kruse

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<sup>1</sup> Kruse, H. D., Schmidt, M. M., and McCollum, E. V., *J. Biol. Chem.*, 1934, **106**, 553.