Tetsu SAKAMURA and Etsuzo MATSUZAKI: The oxygen-uptake by
Hansenula anomala in connection with the nitrogen
metabolism.

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In another paper from our laboratory it will be communicated that the nitrate reduction by *Hansenula anomala* occurs more rapidly in the aerobic condition than the anaerobic, and it is somewhat retarded in the yeast which has been previously cultured with addition of molybdenum in minute concentration (2×10^{-6} M). Since it seems very probable from the above mentioned fact that the nitrate reduction in this organism has to do with any oxidative reaction, it was aimed in the present work to investigate how is the oxygen-uptake influenced by addition of nitrate or other nitrogen sources and what role does molybdenum play on that occasion. For the measurement of oxygen-uptake the Warburg manometer was used and its rate was expressed by mm^3 per mg or Q_{O_2} . Glucose was used as substrate.

On the ordinary respiration without nitrogen source no remarkable action of molybdenum was recognizable. Over a range of pH 5.4~7.8 the oxygen-uptake occurred almost in an equal rate, but it increased in the region of less pH. When NaNO_3 , NaNO_2 or NH_4Cl in M/5000 was applied as nitrogen source, the oxygen-uptake was raised in every cases and this increase was more noticeable in the material without molybdenum than with it. The raise of concentration of the nitrogen sources resulted in increase of the oxygen-uptake to a certain extent. The increased values are shown in the table, comparing the nitrogen sources each other. Yeast material: Without molybdenum. Concentration of nitrogen sources: M/200.

In the early stage of the measurement the oxygen-uptake increased more quickly when ammonium salt was added, compared with the experiments with nitrate. The values in both cases, however, were averaged as time went by. It could be proved other non-nitrogenous salts that the promotion of the oxygen-uptake was not

Time (minute)	Increase of O_2 -uptake (%)		
	NaNO_3	NaNO_2	NH_4Cl
25—85	15	28	23
91—151	40	40	56
157—217	65	—	68

caused by any mechanism of the ion absorption. When aspartic acid or glutamic acid, instead of glucose, was used as substrate, the oxygen-uptake was almost equal to the endogenous respiration, and asparagine slightly diminished this respiration. Addition of glucose to these organic nitrogenous compounds accelerated the oxygen-uptake, and the increased rates exceeded that of the glucose respiration in the same degree as the cases of the inorganic nitrogen sources. The yeast cultured without molybdenum has advantage over the material with it also in this respect, and more amide and less ammonia accumulated in the former than the latter. The reduction of nitrate and nitrite itself theoretically should not need free oxygen and be favored by the anaerobic condition. Moreover, no re-oxidation of the reduction products was proved to occur in the present yeast material. Therefore, the above mentioned increase of the oxygen-uptake may be due to a certain oxidative reaction after the synthesis of amino acid,

I. M/30 glucose
II. glucose + M/500 NaNO_3 .
o ——— o + Mo.
o - - - - - o - Mo.

I. M/30 glucose.
II. glucose + M/500 NaNO_2 .
o ——— o - Mo.
o - - - - - o + Mo.

I. M/30 glucose.
II. glucose + M/1000 NH_4Cl .
o ——— o + Mo.
o - - - - - o - Mo.

which has a far reaching influence on the velocity of the reduction of nitrate and nitrite. The favorable condition of aerobiosis for the nitrate reduction can be interpreted by this assumption. There seems to be also the very part on which molybdenum has an influence.

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