metrically in whole cells decyptified with toluene (Gachelin, 1969), by linking the phosphoenolpyruvate-dependent phosphorylation of glucose to the reduction of NADP⁺ in the presence of glucose 6-phosphate dehydrogenase, or by linking the release of pyruvate, consequent on the phosphoenolpyruvate-dependent phosphorylation of glucose or of glucose analogues, to the oxidation of NADH in the presence of lactate dehydrogenase. Both procedures gave similar rates of reaction and, when added glucose was limiting, both assay systems reflected equivalent nucleotide changes on a molar basis.

It was found that mutant K2.1t contained a highly active phosphotransferase system for glucose with K_m below 25 μ M, the activity of which was not significantly affected by changes in glucose concentration between 0.1 and 50 mM. This system was present but in greatly decreased amounts in both mutant K2.1.22a and mutant R5s. However, only mutant R5s contained a second, inducible, phosphotransferase system for glucose, with K_m in the region of 10 mM. Since this value is close to the glucose concentration at which mutant R5s grows at half-maximal rate, it is probable that this mutant, which still lacks the system that effects the uptake of α -methyl glucoside, contains a component of fraction II of a phosphotransferase system (Kundig & Roseman, 1971) sufficiently altered in its sugar specificity to permit the uptake of glucose when this hexose is present at high concentrations.

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The Control of Glycerol Utilization by Glucose Metabolism

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Escherichia coli strain ML308 shows diauxic growth on a mixture of glucose and glycerol in simple defined media under aerobic conditions. When cells have been trained to glycerol and are growing on an excess of this substrate, the addition of even a small amount of glucose inhibits almost immediately

synthesis of glycerokinase. Glycerol utilization falls by about 67% at the time of glucose challenge and continues at this low rate for about 50 min, when it ceases altogether, and it does not start again until glucose is exhausted. If the amount of glucose added is sufficiently large, a diauxic lag can be seen before growth on glycerol recommences. After glucose challenge the glycerol carbon continues to enter protein, nucleic acid and lipid with a slight increase in the proportion entering the last. The delay before glycerol utilization is completely shut off suggests that this process requires protein synthesis. This is supported by the observation that addition of glucose to washed-cell suspensions metabolizing glycerol depresses the rate of glycerol metabolism but never abolishes it.

These phenomena are a clear example of catabolite inhibition (McGinnis & Paigen, 1969). In this case glycerol metabolism could be depressed by fructose 1,6-diphosphate inhibition of glycerokinase (Lin & Zwaig, 1968). However, fructose 1,6-diphosphate at 10 mM and above inhibits glycerokinase of this strain to a maximum of 93%. In cultures growing on glucose, glycerol or both, direct measurement shows the intracellular concentration to be about 3 mM in all cases. It would seem that the total inhibition of glycerol metabolism cannot stem from glycerokinase inhibition by fructose 1,6-diphosphate, but possibly involves antagonism of glycerol permeation across the bacterial membrane.

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Effect of *n*-Alkanes on the Transport of Glucose in *Candida* sp. Strain 107

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Candida sp. strain 107 is a hydrocarbon-utilizing yeast that has a propensity for producing large amounts of intracellular lipid (Ratledge, 1970). Addition of *n*-alkanes (C₁₃ to C₁₅ in chain length) to this yeast growing exponentially on glucose resulted in the immediate formation of oxidation products of the alkanes and a decrease in glucose consumption (Ratledge, 1968). The constitutive nature of the *n*-alkane-oxidizing system has been confirmed by use of an oxygen electrode: washed suspensions of the yeast grown on either glucose or *n*-alkanes both immediately oxidized all individual alkanes from C₁₀ to C₁₈.

We have subsequently investigated the effect that *n*-alkanes have on glucose utilization. Both alkane- and glucose-grown cells immediately and rapidly