

LEDERBERG, ESTHER H., University of Wisconsin, Madison, Wis.--Pleiotropy for maltose fermentation and phage resistance in Escherichia coli K-12.--Two loci, Mal₁ and Lp₂, have been independently described. Mal₁ controls maltose fermentation; Lp₂ determines resistance to virulent lambda mutants. Both were known to be linked to S (streptomycin) and usually hemizygous in otherwise heterozygous diploids. Recent evidence suggests that both effects are apparently pleiotropic manifestations of a single locus: 1) Existing stocks are either Mal₁⁻Lp₂^r or Mal₁⁺Lp₂^s. 2) When these cultures were crossed, Mal₁⁺Lp₂^r and Mal₁⁻Lp₂^s crossover recombinants were absent despite extensive tests. 3) On EMB maltose agar Mal₁⁻Lp₂^r colonies gave Mal⁺ reversions which proved to be Lp₂^s. In turn, Mal₁⁻Lp₂^r reappeared among the resistant survivors after exposure to the phage, lambda-2. This mutation cycle was repeated several times in a number of stocks. Occasionally mutants resistant to lambda-2 were maltose-positive. These were tested by crosses with Mal₁⁻Lp₂^r and ascribed to mutation at any of several other loci. Genetically distinctive maltose-negative mutants have been found with unaltered phage susceptibility. The pleiotropy has also been noted in a second, probably non-allelic mutant phenotypically identical with Mal₁⁻Lp₂^r at 37° and Mal₁⁻Lp₂^s at 30°. The dual effects are therefore associated at two loci, and separated at others. All the Mal- mutants ferment glucose, and are presumably blocked in the single amylomaltase enzyme. Preliminary attempts to uncover the possible physiological basis of the correlation have been unsuccessful. The addition of either maltose or amylose to the medium had no influence on the phage reaction.

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