

MORSE, M. L., University of Wisconsin, Madison, Wis.  
--Cis-trans position effect in transduction heterogenotes of Escherichia coli.--The phage lambda can transduce a chromosome fragment which includes a cluster of genes for galactose fermentation. Most of the transformed clones are "diploid" or heterogenetic for the transduced genes. Many combinations of non-allelic Gal- mutants give galactose positive heterogenotes as readily as Gal+/Gal-. However, some combinations of Gal- gave smaller and delayed yields of positive clones. Further analysis disclosed a cis-trans position effect between certain loci. For example, while the cis ++/-- heterogenotes formed by transduction from Gal<sub>1</sub>+Gal<sub>2</sub>+ to Gal<sub>1</sub>-Gal<sub>2</sub>- are positive, the trans +/-/+ heterogenotes from the transduction from Gal<sub>1</sub>+Gal<sub>2</sub>- to Gal<sub>1</sub>-Gal<sub>2</sub>+ are phenotypically galactose negative. In the negative clones, positive heterogenotes are later formed by crossing over in occasional cells. Further segregation results in all possible haploid combinations, +-, -+, ++, and --. The delayed yields that were observed initially are based on these secondary events. Reciprocal transductions have given identical phenotypes, so that in heterogenotes the genes in the fragment are functionally equivalent to the homologous genes in the chromosome. The galactose positive phenotype thus requires that + alleles be in adjacent positions either in the fragment or the chromosome.

Reprinted from Genetics, 40:586-587, 1955.