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Locus Determining P1 Phage Restriction in *Escherichia coli*

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The locus determining P1 phage restriction has been mapped at 89.3 min on the *Escherichia coli* map, about 0.2 min away from the hsp marker.

A virulent strain of the transducing phage P1 has recently been isolated by Donch (1). This mutant, P1.B_{vir}, can infect both *Escherichia coli* K-12 and *E. coli* B with about equal efficiency. However, its efficiency of plating on *E. coli* HfrC is around 10^{-3}. This property can be explained by assuming that P1 phage restriction is associated with the integrated sex factor, as in the case of T3 phage (2). On the other hand, it may be related to the gene responsible for λ phage restriction (7).

To identify the P1 phage restriction marker, *por* (to differentiate from P1 resistance which should be designated by convention as pon^R), we performed transduction experiments by using *E. coli* HfrC as the donor and *E. coli* B as the recipient (3). The transducing phage, P1.B_{vir}, was kindly supplied by J. Donch; *E. coli* HfrC, which can restrict this phage or por^+, was the gift of E. C. C. Lin; and an *E. coli* B, which is leu^-, thr^-, $ilvA^-$, str^R, λr_B, λm_B^+, and por^-, was supplied by S. W. Glover. A total of 100 thr^+ transductants have been analyzed (Table 1). It is consistent with the markers, *leu*, *thr*, *por*, and λ*r*, arranged in that order. Their relative positions with respect to *serB* and *thyR* have not been studied (5).

TABLE 1. *Classes of transductants and their relative frequencies*

Class	No. of transductants
leu^-, thr^+, por^-, λr_B^-	85
leu^+, thr^+, por^-, λr_B^-	3
leu^-, thr^+, por^+, λr_B^-	7
leu^-, thr^+, por^-, λr_K^+	0
leu^+, thr^+, por^+, λr_B^-	0
leu^+, thr^+, por^-, λr_K^+	0
leu^-, thr^+, por^+, λr_K^+	5
leu^+, thr^+, por^+, λr_K^+	0
Total	100

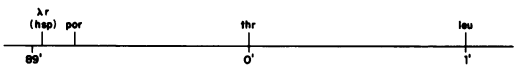

FIG. 1. *Location of the por marker with respect to known markers.*

Using the relationship between map distance and cotransducing frequency (8), we obtained the map shown in Fig. 1. The distance between the markers, *por* and λ*r*, is too small to be distinguished by conjugation experiments (6).

The present result illustrates that there are probably many different restricting enzymes (4), each of which may act on a different kind of phage.

LITERATURE CITED

1. Donch, J., and J. Greenberg. 1968. Ultraviolet sensitivity gene of *Escherichia coli* B. J. Bacteriol. 95:1555–1559.
2. Fraser, D. K. 1957. Host range mutants and semitemperate mutants of bacteriophage T3. Virology 3:527–553.
3. Lennox, E. S. 1955. Transduction of linked genetic characters of the host by bacteriophage Pl. Virology 1:190–206.
4. Meselson, M., and R. Yuan. 1968. DNA restriction enzymes from *E. coli*. Nature 217:1110–1114.
5. Taylor, A. L., and C. D. Trotter. 1967. Revised linkage map of *Escherichia coli*. Bacteriol. Rev. 31:332–353.
6. Wollman, E. L., and F. Jacob. 1955. Sur le mécanisme du transfert de matériel génétique au cours de la recombinaison chez *Escherichia coli* K-12. Compt. Rend. 240:2449–2451.
7. Wood, W. B. 1966. Host specificity of DNA produced by *Escherichia coli:* bacterial mutants affecting the restriction and modification of DNA. J. Mol. Biol. 16:118–133.
8. Wu, T. T. 1966. A model for three-point analysis of random general transduction. Genetics 54:405–410.