GENETIC RESTRICTION IN ESCHERICHIA COLI STRAIN W

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ABSTRACT

The ability of various phages to propagate on Escherichia coli strain W was investigated. Phages P1, T2, T3, T4, T5, T6 and T7 could not be shown to form plaques on this strain. Phages T2, T3, T5 and T6 prevented the development of a bacterial lawn when added to a plate at an input ratio of about three phage per bacterium; it appears these phages exerted a killing effect on strain W. Phage P1 and phage T4 did not exhibit this killing effect. Phage T1 formed atypical plaques on strain W with an efficiency of plating of 10^{-4}; it appears these plaques are due to mutants occuring in the T1 population able to propagate on strain W.

All of the above phages adsorbed efficiently to strain W with the exception of T4, explaining its inability to either propagate on or kill strain W. The infection of strain W by P1 was similar in most respects to that of λ but in order to establish the occurence of conventional restriction, DNA degradation would need to be demonstrated.

Phages were isolated which propagate on strain W; they are similar in morphology to phages T5 and λ and do not readily adsorb to E coli strains B, C or K.

The supernatant from broth cultures of strain W was shown to contain two closely related phages, one plating on E coli C, and the other on E coli K. Each possesses a characteristic pattern of plating efficiencies on strains C and K when propagated alternately in these two hosts but the two phages were shown to be co-immune and identical with respect to heat sensitivity, morphology and serology.

Both tended to lose the ability to exclude phage P1 on lysogenising strain C once having mutated to plate on strain K. This may be due to the integration of the mutated phage at alternate "non-restricting" sites on the E coli C chromosome.

A series of conjugal crosses was employed to determine the sites of integration of the phages on the chromosomes of E coli strains W and C. The phage present in the W supernatant which plated on K was found to integrate close to the proline loci on the chromosome of E coli W but the phage plating on C appeared to have more than one locus, one of which may map close to the 85 minute mark on the linkage map of E coli W (36, Figure 22). No information has so far been obtained concerning the sites of integration of the w phages in restrictive and non-restrictive lysogens of E coli C. The failure to obtain a 'cured' strain of E coli W by elimination of the prophage integrated at the two mapped sites leaves open the possibility of the existence of more than one integration site of phage w.C on the E coli W chromosome.

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