RECOMBINATION IN BACTERIA

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Recombination has been ascertained in a group of *E. coli* strains, one of which, strain K-12, has been studied more extensively than any other. In this strain, recombination is governed by a system of mating types which shows an exceptional mode of hereditary transmission. Original K-12 is self-compatible (F +); some mutants derived from it proved to be self-incompatible (F —). Crosses F + × F — are fertile, and all the progeny is F +. An F — strain can be converted to F + by incubation in certain conditions with an F — strain, no other genetic exchange taking place with the transfer of F +. The nature of the agent transducing self-compatibility is unknown. The kinetics of transduction seems to indicate that contact between cells is essential. An originally F — strain which has become F + by transduction is stable and can transduce F + in its turn.

Two other types of behaviour for compatibility have been found. A strain (*Hfr*) which behaves as an F + for compatibility, shows much higher fertility (i.e., frequency of recombination) than comparable F + strains; but cannot transduce F +. The progeny of an Hfr × F — cross is mostly F —, but a few recombinants are Hfr, in close linkage with a Gal marker. Another strain (Fr) behaves as an F —, but cannot be transduced to F +. Progeny from F + × Fr shows a segregation of F + and F —. Fr strains do not compete with other F — strains for F + when a limited supply of this agent is available.

The mating-type system shows a profound influence on the recombination pattern, as shown by the segregation of unselected markers. The contribution from the F + (or Hfr) parent undergoes an almost constant elimination, which is highest for one particular point or region of the chromosome (s). This results in considerable differences of reciprocal crosses.