ADELBERG, EDWARD A., and SARAH N. BURNS, University of California, Berkeley, Calif.: A variant sex factor in Escherichia coli.—The sex factor (F) of Escherichia coli belongs to the class of genetic determinants called episomes: determinants which can exist alternatively as cytoplasmic particles or as attached chromosomal elements. The origin and properties of a variant F will be described.—The wild-type sex factor (F^1) of strain K-12 is characterized by its low affinity for the chromosome and its lack of any preferential site of attachment. The variant sex factor, F^2, arose in Hfr strain Plx, in which F^1 had been stably attached to the chromosome between the loci pro1 (controlling proline synthesis) and lac (controlling lactose fermentation). In oriented chromosome transfer by Plx, pro1 is the first marker to be transferred and lac is the last; the attached sex factor is linked closely to lac.—Strain Plx gave rise spontaneously to strain Plx-1, in which the sex factor has acquired two new properties: its attachment to the chromosome is unstable, kinetic studies of zygote formation indicating a rapid alternation between the attached and cytoplasmic states; and it exhibits a high and specific affinity for the site at which F^1 had been fixed. The latter property is recognized by the fact that infection with F^2 converts F^- cells into donors which transfer their chromosome at high frequency and with the same orientation as Hfr strain Plx. It is proposed that F^2 arose by genetic exchange between attached F^1 and chromosome; the incorporation of chromosomal material would explain the high affinity of F^2 for the original site of attachment.