



**FIGURE 23.7.** At least one cross-over must occur if the chromosomes are to segregate properly at meiosis. During the first division of meiosis, homologous chromosomes attach to the meiotic spindle and are pulled in opposite directions. They remain attached to each other by *chiasmata* for some time; this attachment is necessary for proper segregation. However, if this cross-over occurs at the tips of the chromosome, almost no genes undergo effective recombination.