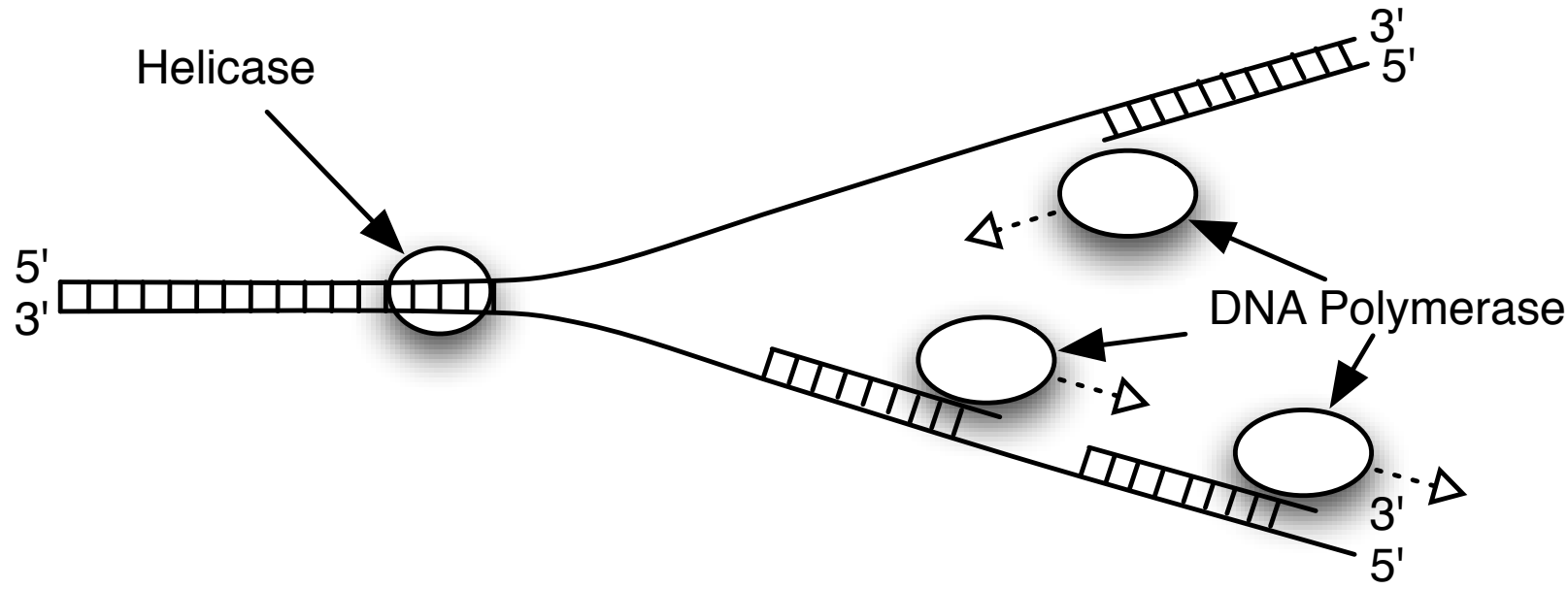

Figure 1.1: The DNA replication process. Double-stranded DNA is separated into its two strands with the help of helicase proteins. DNA polymerase proteins polymerize nucleotides that are complementary to the separated strands to create two double-stranded DNA molecules. A couple of important enzymes not pictured are primase, which creates short initial complementary strands onto which DNA polymerase appends, and ligase, which joins together the multiple separate strands that are synthesized against the lagging strand (i.e., the strand with its 3' end at the point of strand separation).

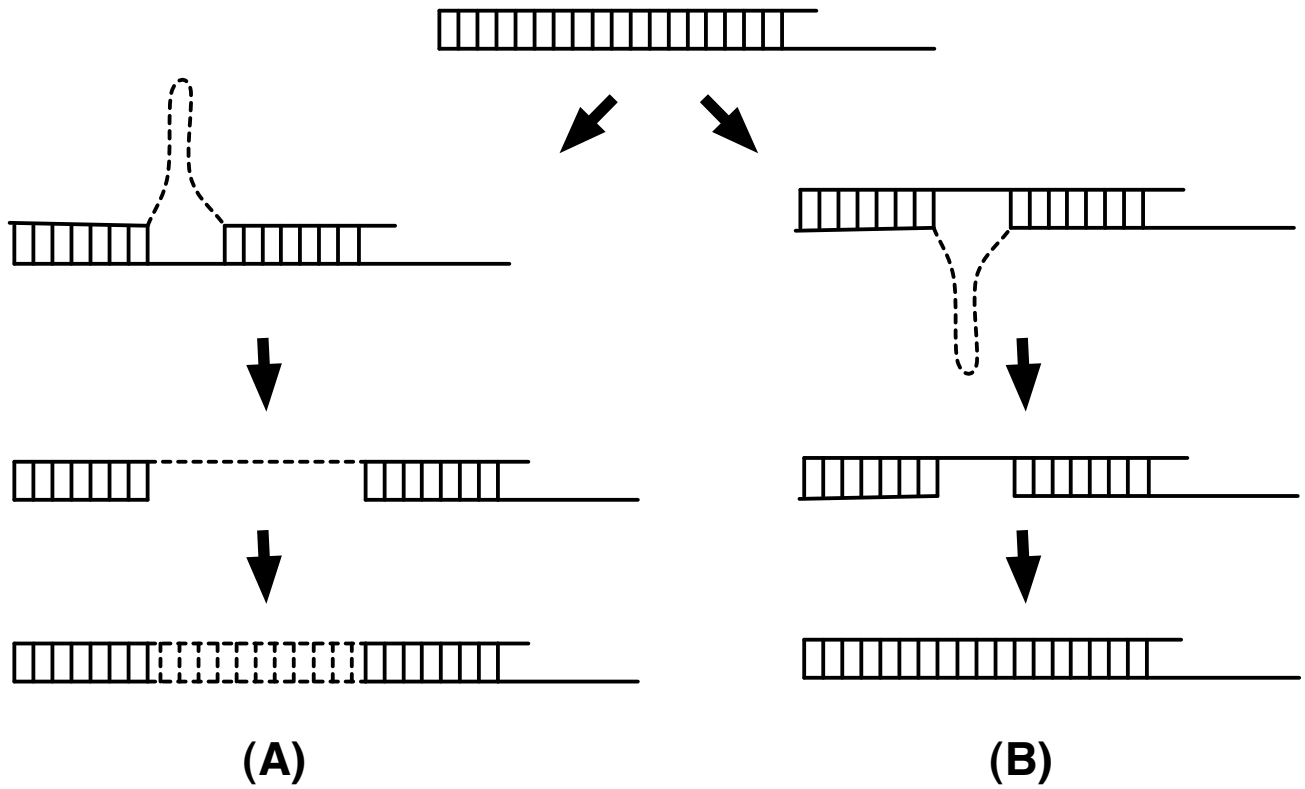

Figure 1.2: Replication slippage results in insertions and deletions. In this figure, horizontal lines represent single strands of DNA, with the top strand (the child) being copied from the bottom template strand (the parent). Vertical ticks indicate base pairing. During replication, the two strands may separate and re-pair incorrectly, resulting in a loop in either the child (A) or the parent (B) sequence. If the child sequence is used as a template to repair the loop, then either an insertion (A) or a deletion (B) will occur. If the parent sequence is used for repair instead, then no mutation will occur (not shown).

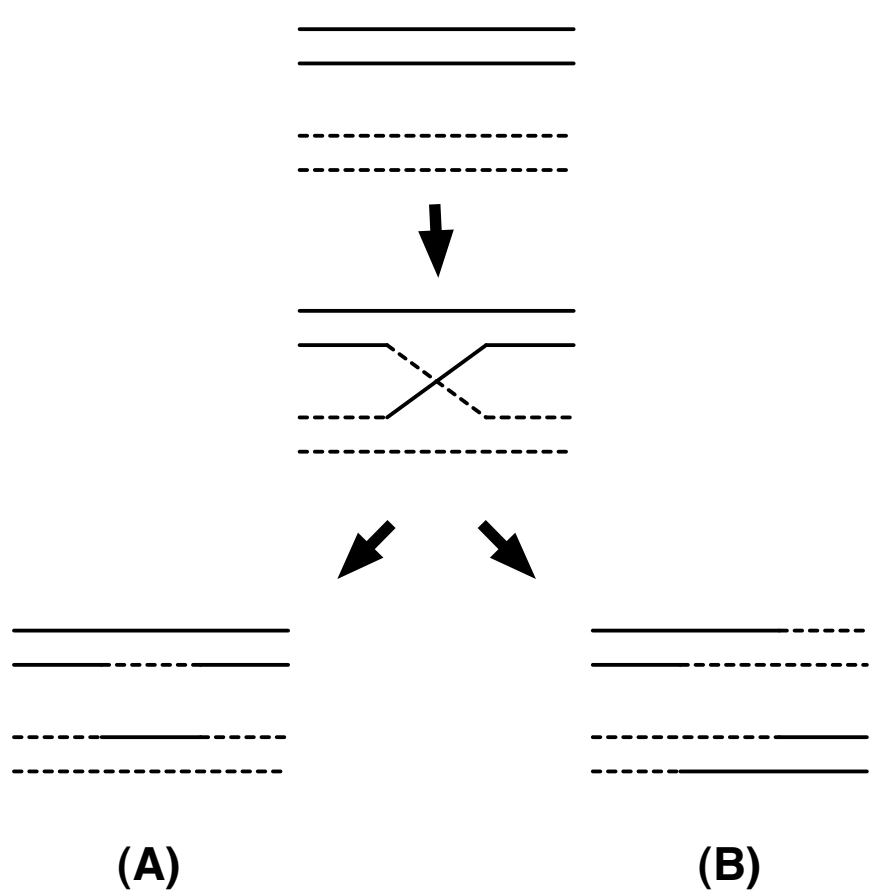

Figure 1.3: The results of recombination. Heteroduplex DNA forms due to migration of the junction. Two scenarious arise depending on how the junction is resolved: (A) no crossing over occurs (DNA flanking heteroduplex DNA is from the same chromosome) or (B) crossing over occurs, resulting in the swapping chromosome ends. Heteroduplex DNA is repaired by excising one strand and replacing using the other as a template. If the template strands for repair both orignally came from the same double-stranded chromosome, then gene conversion occurs.

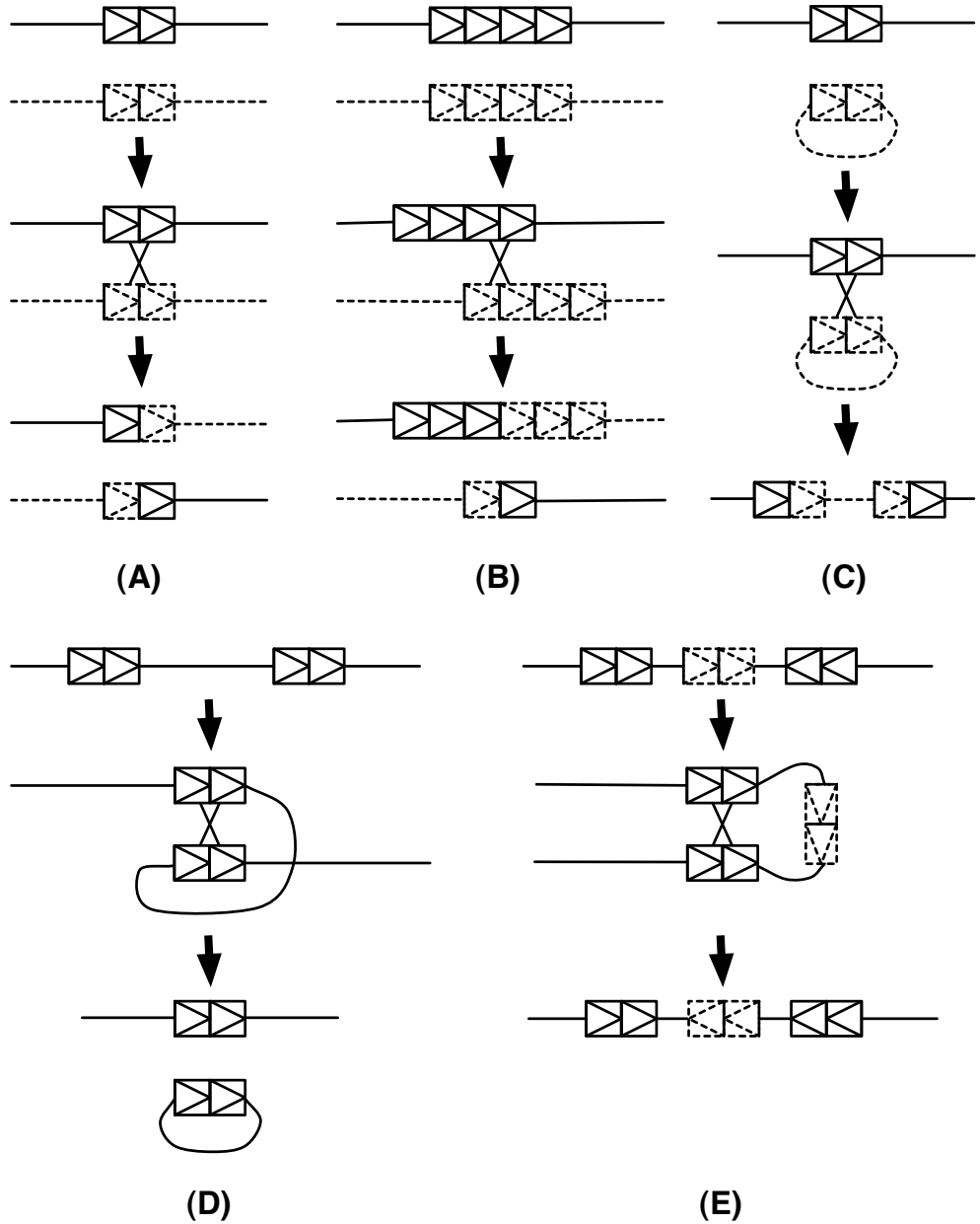

Figure 1.4: The results of crossing over. (A), (B), and (C) are examples of interchromosomal recombination, while (D) and (E) are examples of intrachromosomal recombination. Lines represent chromosomes and boxes indicate highly similar regions of DNA (with orientation given by their contained triangles). The possible results are exchange of chromosome ends (A), insertion and deletion (B), chromosome fusion (C), chromosome fission (D), and inversion (E).