

Steps of Rolling Circle Replication (5)

This mechanism occurs in some viruses, bacteriophages and the F-factor of *E. coli*. There are three phases of the replication. These are as follows:

- (i) Initiation
- (ii) Elongation
- (iii) Termination

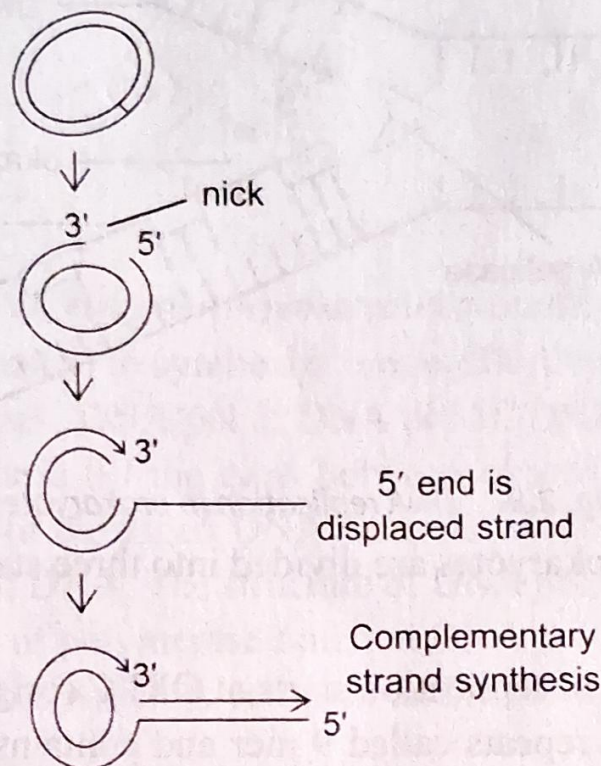


Fig. 2.7. Rolling-circle mechanism of replication.

- (i) **Initiation:** Rolling circle replication begins with the enzymatic nicking of one strand of the ds circular DNA at double stranded origin (dso) site.
- (ii) **Elongation:** The elongation begins at the region where nick is present. The nick on the single strand of DNA molecule creates a free 3' OH end. This 3' hydroxyl end of the nicked strand is elongated by DNA polymerase III using unnicked strand as a template where as the 5' phosphate end is displaced by an enzyme helicase. This displacement or cleavage produces a double-stranded circular DNA molecule and a single-stranded linear DNA molecule. After the cleavage the linear molecule becomes circularize and serves as a template for a complementary strand.

- (iii) **Termination:** In this step, in order to make DNA from the single strand, an enzyme RNA polymerase and DNA polymerase III started copying the single stranded origin (SSO) DNA to make a new double stranded circle. After that DNA polymerase I removes the primer and places DNA on that position. Now, the gaps of this displaced DNA is filled by DNA ligase and a new double-stranded circular DNA molecule is formed.