Source: [KBBIO101CentralDogma]

1 | DNA Replication

DNA replication is known to be "semi-conservative" — meaning that it is a process that pairs a synthesized half of the DNA with an original half of the DNA (i.e. takes the ORIGINAL template strand + makes the NEW coding strand & takes the ORIGINAL coding strand + makes the NEW template strand.)

Because **polymerases copy uni-directionally** => DNA polyemrease move along the 3' to 5' DNA to create a copy 5' to 3'. Meaning, the polymerize is able to add nucleotide onto the 3' end of the DNA.

As mentioned before, **DNA Polymerease** is the enzyme that catalyzes this process of DNA replication.

1.1 | The Process of DNA Replication

1.1.1 | DNA Unzipping

=> DNA is unzipped at the origin of replication The parent DNA strand serves as a template for the new strand; when it is unzipped, the nucleotides are exposed for complementary base pairing. **Helicase** is the enzyme that unzips the DNA molecule, breaking the hydrogen bonds between nucleotides to expose them for complementary base pairing

1.1.2 | DNA priming

DNA polymersease will REQUIRE a double-stranded area to begin work from, so Primase synthesize already double-stranded RNA primers that DNA polymerease could bootstrap to the single-stranded DNA to begin the replication process (think: create-react-app)

The unwinded DNA is primed to help DNA polymerase's replication process. **Primcase** is attached to the replication bubble to synthesize an RNA-based primer that would help the DNA polymerease perform the replication process.

1.1.3 | DNA "flexing" (what's the actual word?)

The primed DNA is broken and rejoined in order to reduce strain caused by unzipping. Topoisomerase is responsible for relieving unwinding-induced.

1.1.4 | The actual process of replication

In this step, DNA polymerease does we came here to do.

Because DNA polymerase could only add nucleotides 5' to 3', there is two types of styles of copying depending on which of the two strands are being copied.

- In the **leading** strand (3' to 5'), polymerase will run alongside the helicase for they are opening and replicating on the same direction
- In the **lagging** strand (5' to 3'), polymerase will wait until the helicate opens a little segment, and rushes forward and move backwards

NOTE: the lagging strand… 1) takes longer to transcribe 2) is done in small chunks (each "rush forward"). Each chunk is called an ogazaki fragment — this is why there was that [KBhBIO101mRNAPreprocessing] process during transcription because that would help correct any errors in joining these fragments

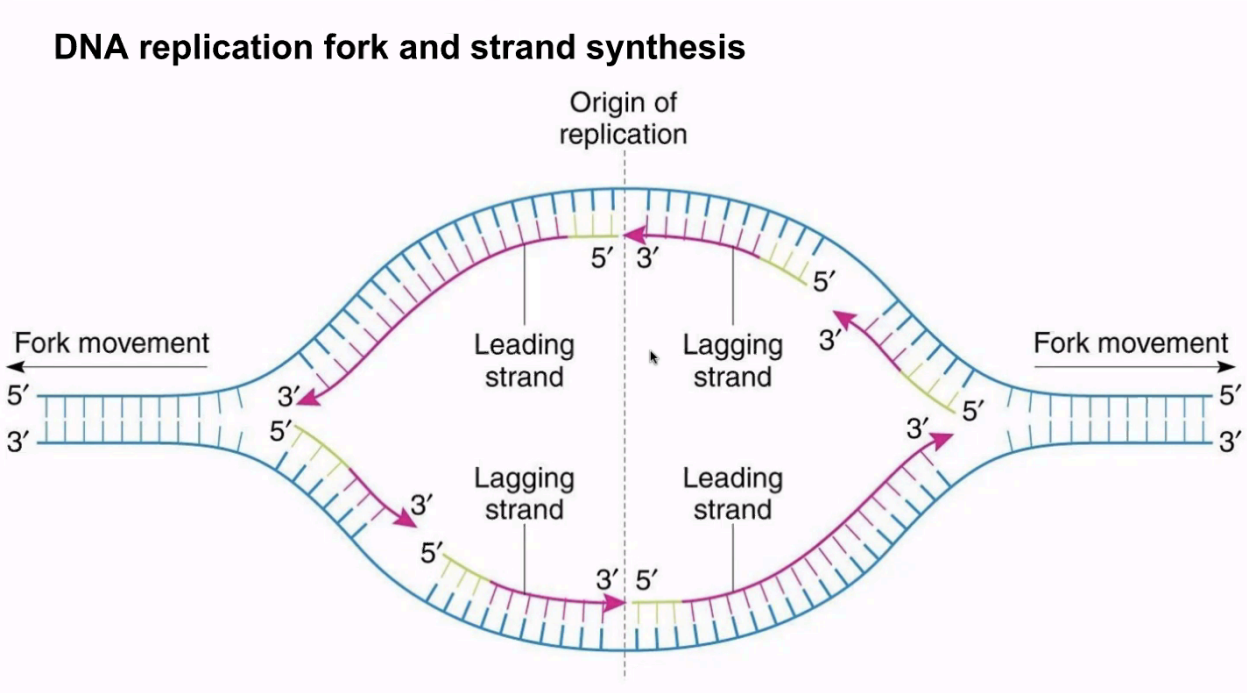

Figure 1: leadinglagging.png

- DNA polymerse will detect unfitting bonds and remove leftover RNA primer bootstrap units to repair them in a process called “proofreading.” DNA polimersease is assisted with “glue” ligase to help the DNA polymerease pick out and replace problematic/unneeded nucleotides and perhaps their neighbors. This is where the Ogazaki fragments get joined.

Stage of DNA Replication Main purpose of this step Key enzymes and structures involved Outcome of this process

Proofreading

Replicated DNA is checked for any irregularities + patched as needed in order to prevent error DNA polymerase and “mismatch repair enzymes” #ask? A DNA ready to be utilized