



Telomeres

Carl Andersen Tan – January 6 Textbook Presentation
End of DNA replication section



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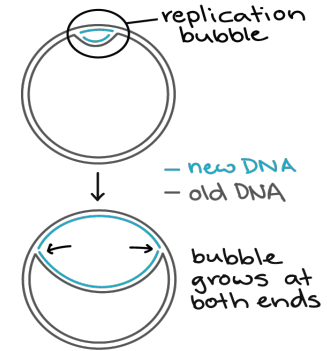
1 Termination of DNA Replication

2 Function of Telomeres

Termination of DNA replication

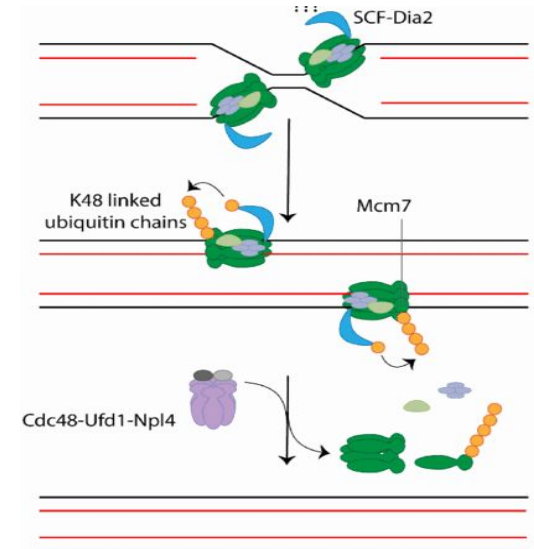
Prokaryotes

- DNA replication begins at a single origin
- A special DNA sequence slows down the movement of each fork causing them to disassemble



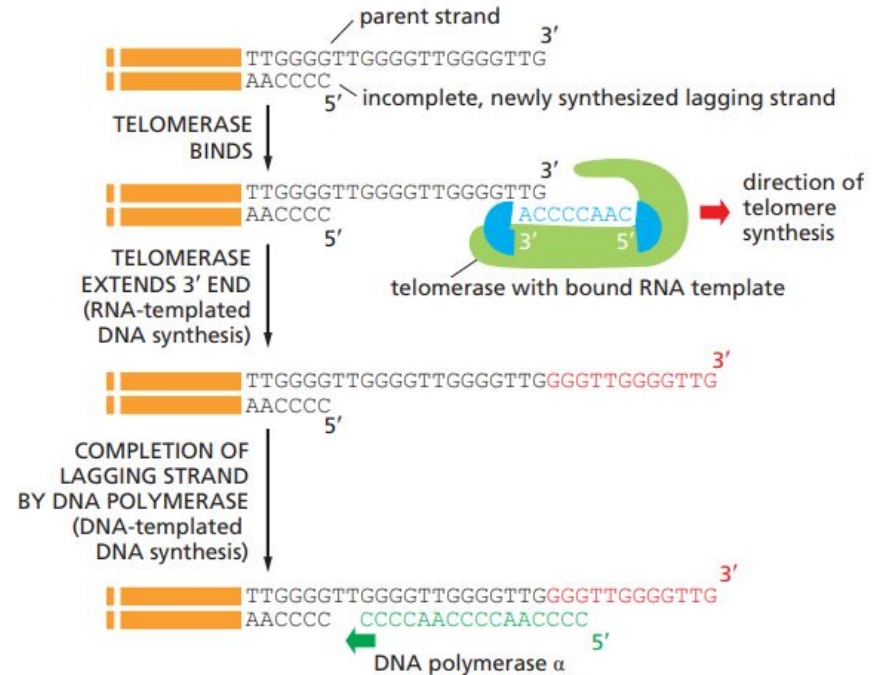
Eukaryotes

- Fork encounters cause termination
- CMG helicase is modified by ubiquitin, causing disassembly



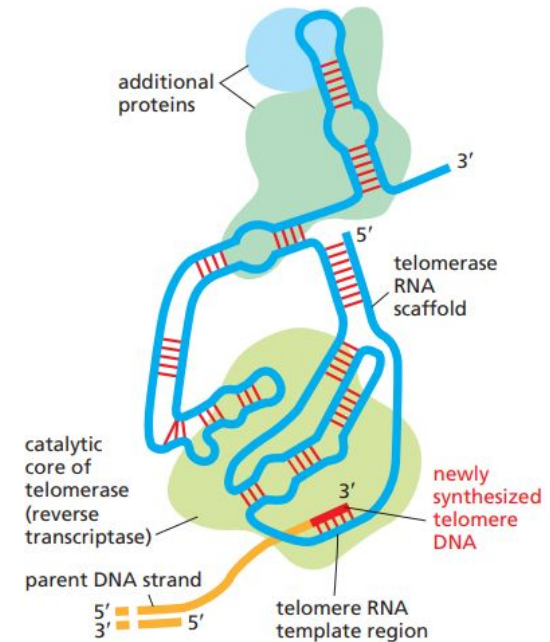
Telomeres and Telomerase

- The final RNA primer at the end of the lagging strand cannot be replaced by DNA polymerase
- Telomeres are special nucleotide sequences at the end of the eukaryotic chromosome
- Telomerase replenishes telomeres after each cell division



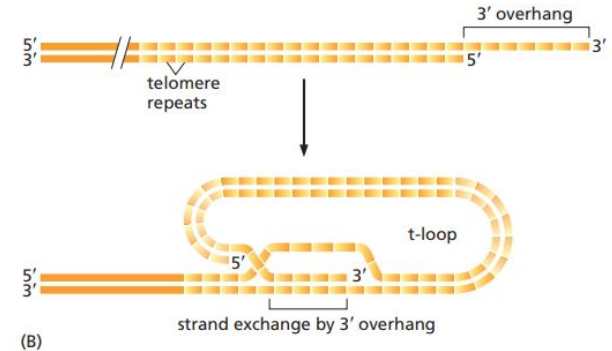
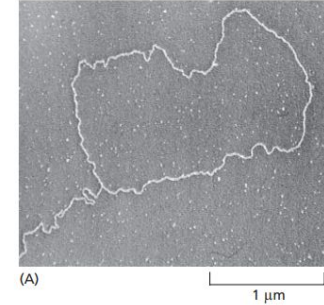
Structure of Telomerase

- Telomerase provides an RNA scaffold that provides the template of telomere repeat synthesis
- Contains reverse transcriptase domain
- In some organisms, telomerases have proteins that guide the telomerase to the ends of the chromosome



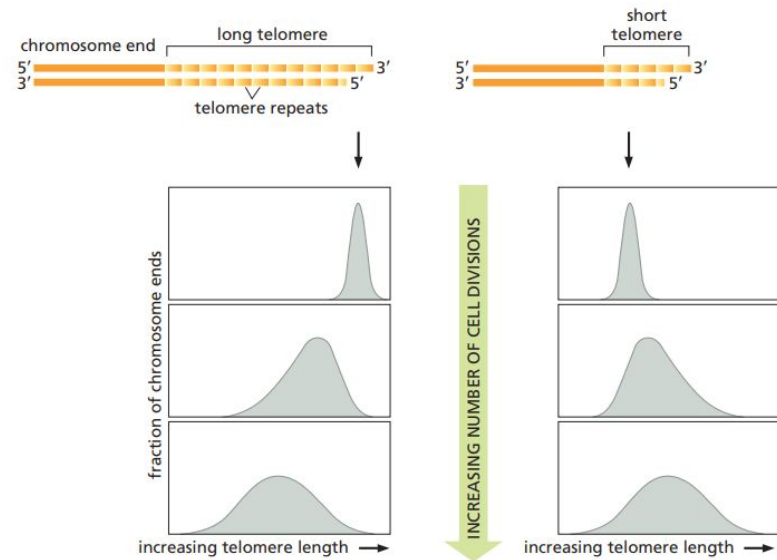
Packaging of Telomeres

- Telomeres protect chromosome ends preventing them from being mistaken for accidental DNA breaks
- GGGTTA repeats form a complex with caps the DNA
- A nuclease degrades 5' end leaving a 3' single strand overhang
- Forms a t-loop which conceals chromosome ends



Telomere Length is Regulated

- Telomere length shorten in most somatic cell division, acting as a biological clock
- Telomere shortening triggers replicative senescence protecting against cancer
- Most cancer cells reactivate telomerase enabling indefinite growth
- Telomere shortening protects against cancer however can lead to aging-related diseases–dyskeratosis congenital





Thank you

