

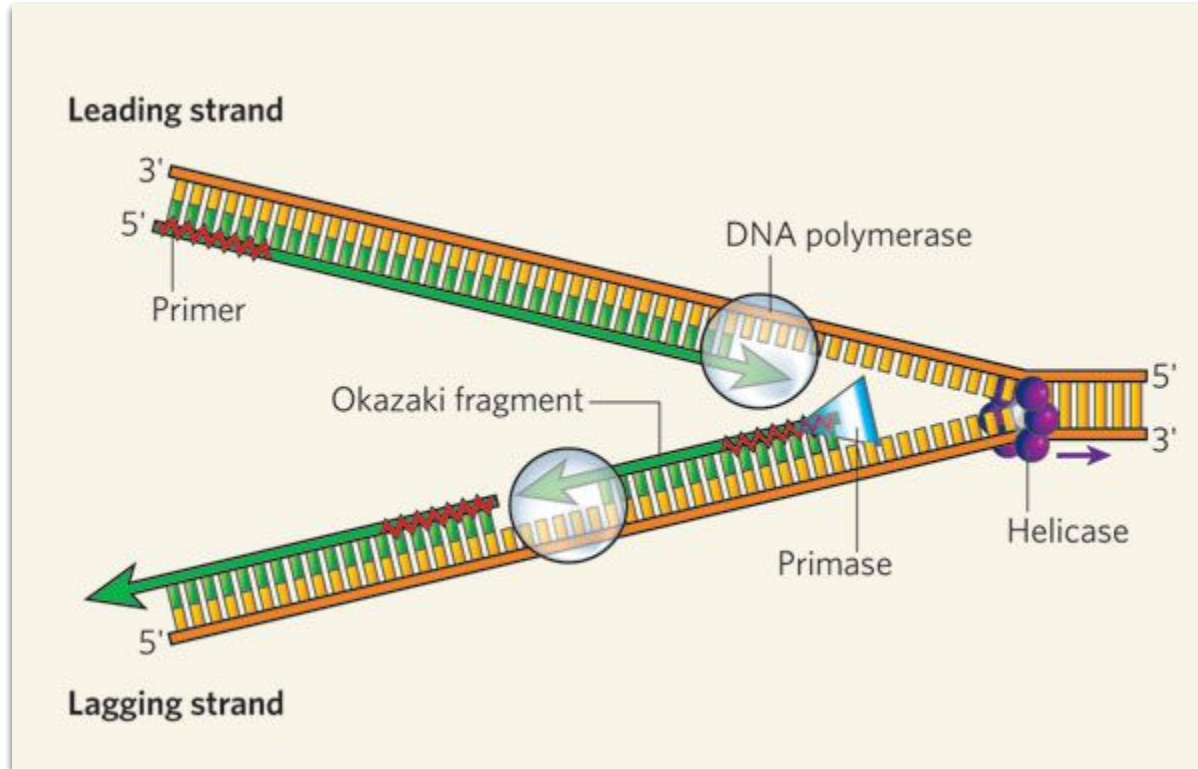
PCR

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What is PCR?

- Polymerase chain reaction
- Invented in 1983 by Kary Mullis
- Used to amplify the amount of a certain DNA, starting from a small amount
 - Most used DNA cloning technology today
- Applications:
 - Forensic science (DNA fingerprinting)
 - Molecular genetics (Phylogenetic analysis)
- Possible because of DNA polymerase

A reminder on DNA replication



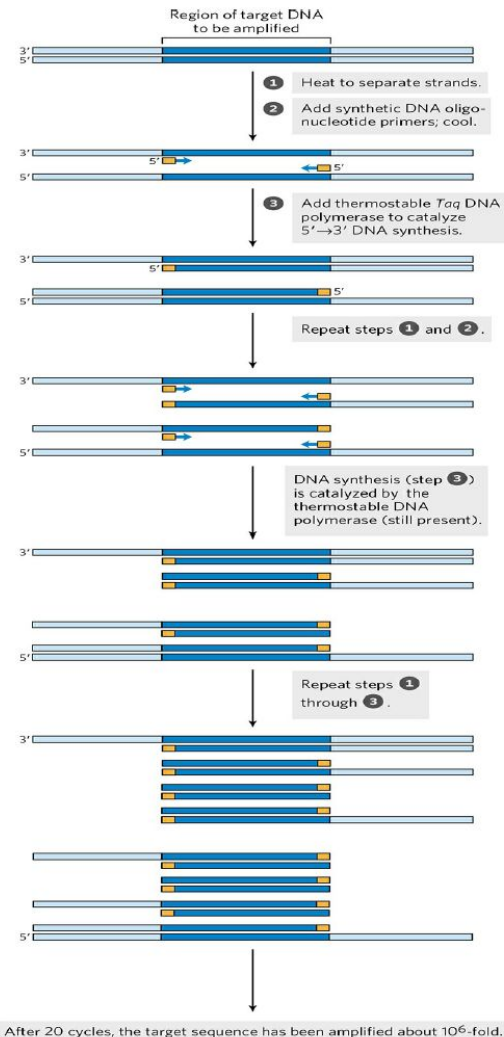
DNA Replication
of the leading and
lagging strand,
Nature

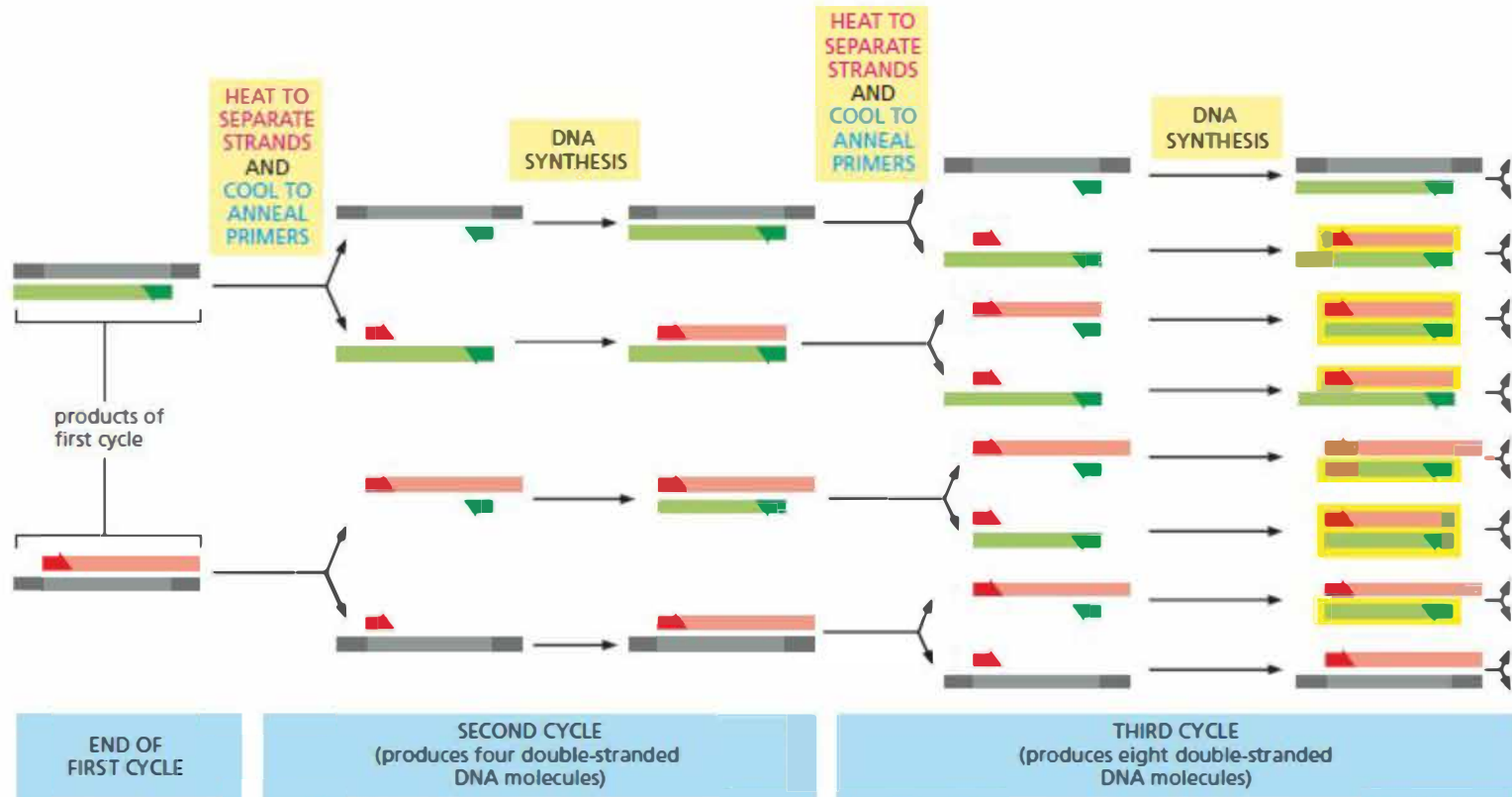
Materials

- **DNA polymerases** (esp. heat-stable polymerases: *Taq* polymerase etc.)
 - Enzymes for synthesis of DNA
- **Deoxynucleosides triphosphates (dNTPs)**
 - Subunits (building blocks) of the DNA
- **DNA primers**
 - Short DNA strands to initiate the synthesis process
 - Designed based on sequence of interest
- **DNA sample**
 - DNA that is to be amplified

Process

- 1) Sample DNA is heated until the strands separate
(Denaturation)
- 2) DNA primers are added and the solution is cooled
(Annealing)
 - Primers will pair with complementary sequences on the sample DNA when cooled
- 3) *Taq* DNA polymerase synthesises new complementary strands for both strands in 5' to 3' direction **(Elongation)**
 - using dNTPs
 - *Taq* polymerase does not denature because of its thermal stability
- 4) Steps 1 to 3 are repeated to produce more copies of sample DNA





Why is PCR good?

1. It's fast
2. It's easy

THANK YOU

Resources

1. Alberts, B., Bray, D., Hopkin, K., Johnson, A., Lewis, J., Raff, M., . . . Walter, P. (2014). *Essential cell biology*. New York, NY: Garland Science.
2. Lehninger, A. L., Nelson, D. L., & Cox, M. M. (2013). *Principles of biochemistry*. New York: W.H. Freeman.