Molecular Biology 2

- ~~iClicker 25A~~
- DNA Structure
- DNA Replication
- Central Dogma / Transcription
- ~~iClicker 25B~~

- Due in Lab this week
  - Nothing!!
  -
-
- Exam 2
  - Last name A-E in McCormick Cafe
  - Last name F-Z in Lipke

DNA Structure and Replication

Rules about DNA and RNA

① DNA & RNA polymers have direction 5'→3'

- one end is different from the other chemical naming

A T → bases

([5' end - P - D - P - D - OH - 3' end = 5' A T 3'

backbone phosphate sugar

= 5'-AT-3'

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(5' end backbone ↓ phosphate (sugar

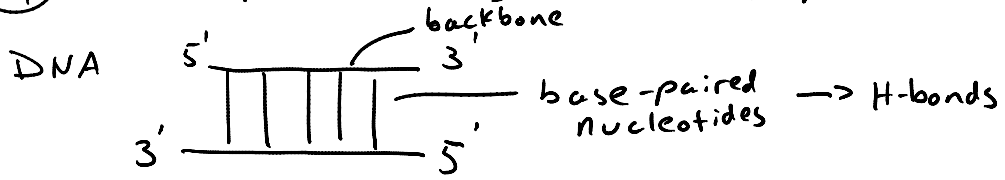
= 5'-AT-3'

② polymerization -> formation of a DNA or RNA strand
5' -> 3'
- new sequence is based on base-pairing

③ base-pairing -
DNA - A, G, C, T
RNA - A, G, C, U
} nucleotides

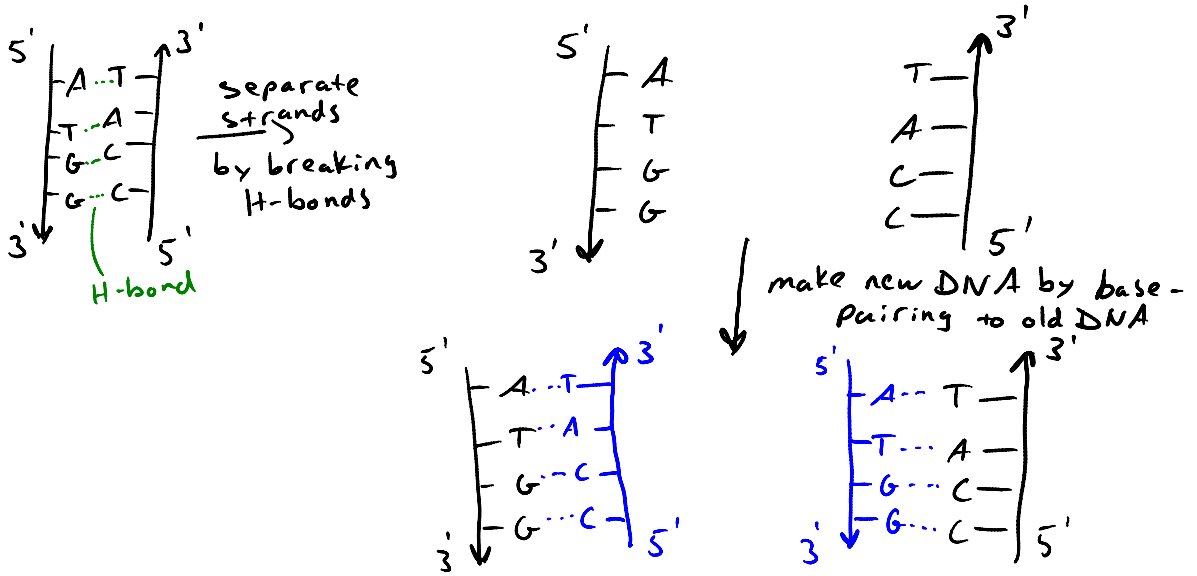
A-T → 2 H-bonds
or in RNA A-U
G-C → 3 H-bonds

④ base-paired strands are anti-parallel



DNA Replication

mitosis & meiosis require gene duplication = DNA replication



Mutations

ⓐ mistakes in DNA replication
DNA polymerase -> it can proofread the sequence

it makes 1 error in 10^{10} nucleotides
DNA pol. adds 1,000 nt. / sec

ⓑ mutagens - chemicals / radiation that can cau...

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(b) mutagens – chemicals / radiation that can cause mutations if they are not corrected before replication

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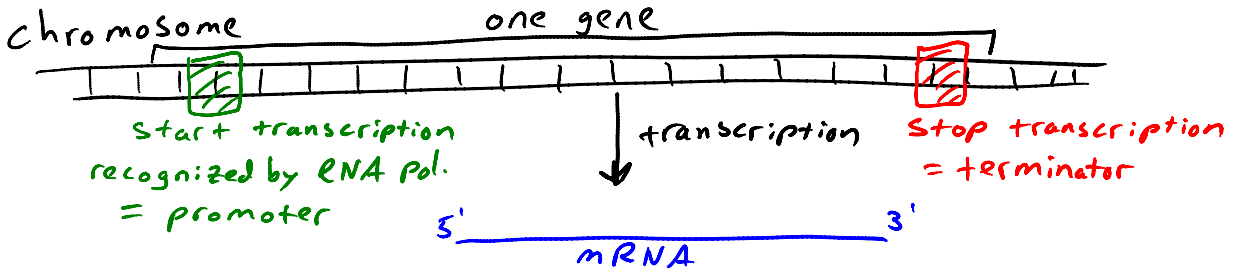
Central Dogma → how a gene (DNA) makes protein

DNA (permanent) —transcription: make an mRNA copy of DNA→ mRNA messenger RNA (temporary) —translation: make protein using mRNA template→ protein temporary → "does stuff"

DNA	versus	RNA
– 2 strands double-helix		– 1 strand
– permanent		– temporary
– A, G, C, T		– A, G, C, U

Transcription – making mRNA copy of DNA so protein can be made
- RNA polymerase
- only one strand of DNA is copied



Details
1. RNA pol. binds to promoter on DNA
2. RNA pol. unzips DNA by breaking H-bonds
3. RNA pol. makes mRNA 5' → 3'
4. RNA pol. continues until terminator
5. mRNA is released from RNA pol.
   - only 1 strand is made
   - usually only encodes 1 protein

U G C A A C U

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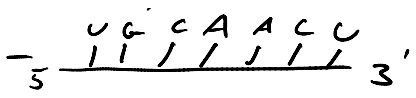

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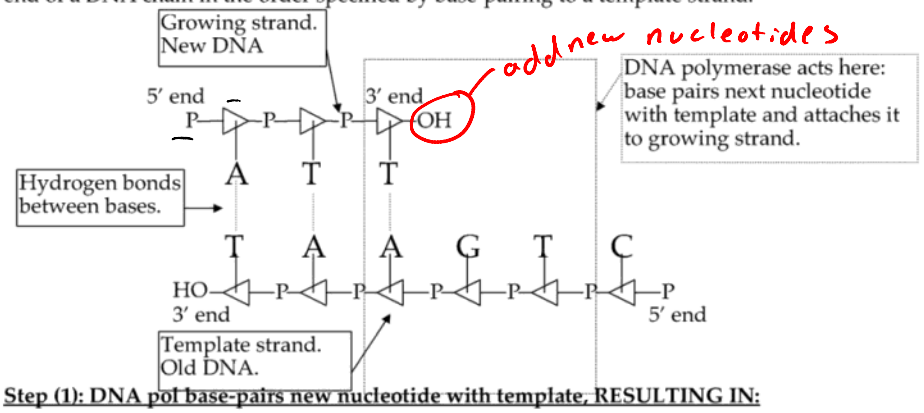
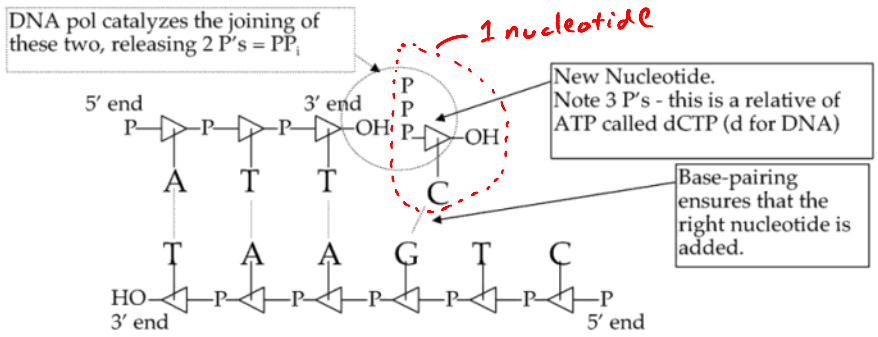
DNA Replication: Details:

• DNA replication is one by enzyme DNA polymerase (DNA pol). It adds nucleotides to the 3′ end of a DNA chain in the order specified by base-pairing to a template strand.

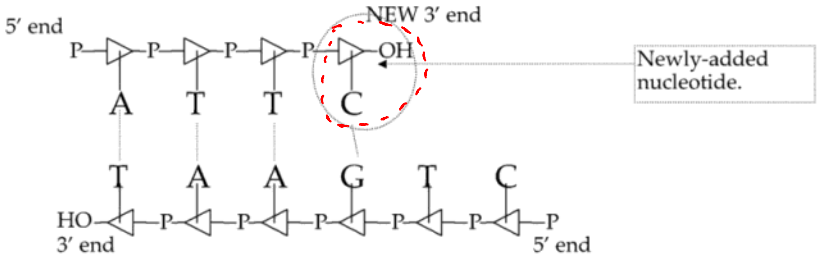


Step (1): DNA pol base-pairs new nucleotide with template, RESULTING IN:



DNA polymerase is the catalyst

Step (2): DNA pol joins the new nucleotide to the growing chain, RESULTING IN:



Later steps: repeat (1) then (2)

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