

# MOLECULAR GENETICS

1 August 2016

Campbell 10<sup>th</sup>: 303-325, 7<sup>th</sup>: Sadava: 257-279

replication: <http://www.youtube.com/watch?v=4jtmOZaIvS0> (p 246-247):

## Remember: Central Dogma: (p 337)

Transcription Translation  
DNA → RNA → protein

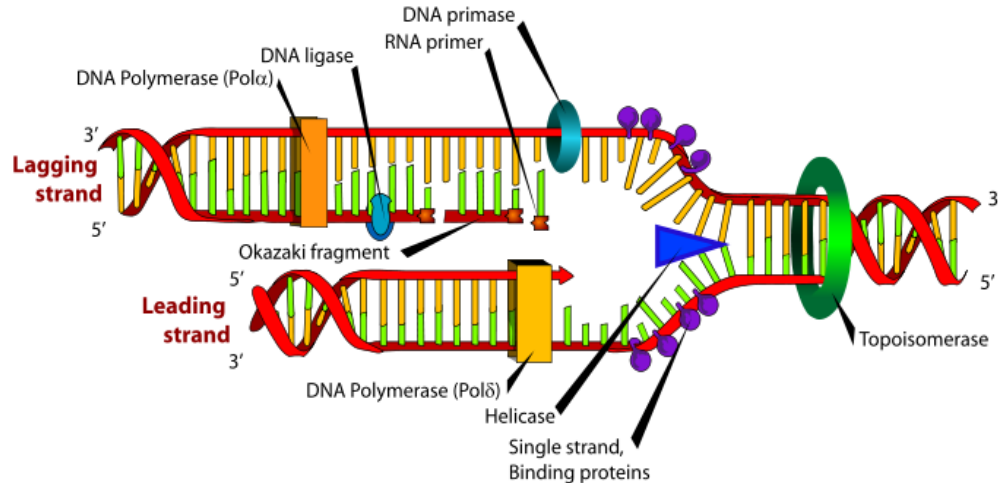
## One gene one enzyme

Beadle and Tatum: (p 335):

three classes of arginine requiring mutants, all required arg, some with citrulline, few of those with ornithine, conclude sequence:

Xanthine → ornithine → citrulline → arginine

Deduced that mutations altered enzyme activity: a gene codes for an enzyme (Now modified: **one gene one polypeptide.**)



**Transcription** in nucleus (p. 340) (VIDEO: <http://www.youtube.com/watch?v=WsofH466lqk&NR=1>) (starts at 19 sec, complex)

RNA polymerase uses DNA as **template**

makes: messenger RNA (mRNA)  
ribosomal RNA (rRNA)  
transfer RNAs (tRNA)

transcription and translation, fancy:

[http://www.youtube.com/watch?v=41\\_Ne5mS2ls](http://www.youtube.com/watch?v=41_Ne5mS2ls)

**Translation:** (p 345) Good YouTube:

<https://www.youtube.com/watch?v=Ikq9AcBcohA>

in cytoplasm on **ribosomes** (p 345 intro)  
**mRNA** (needs to be edited in eukaryotes to remove the introns)

**tRNAs** for all amino acids

Charging of the tRNA and translation:

<http://www.youtube.com/watch?v=0B-CFLNAnX8>

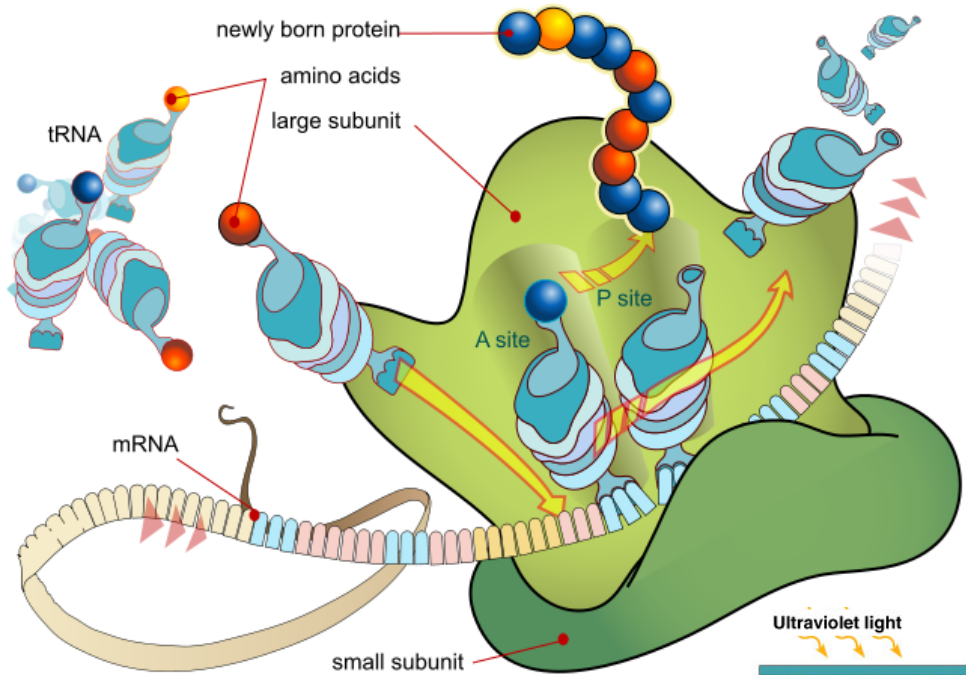
genetic code:

64 codons of three bases each (p 339)

**Illustrate transfer RNA:** (p 346)

two crucial features, anticodon, *specific* AA  
overall picture: (p 352)

<https://www.youtube.com/watch?v=4QSTcfsbcca>



(From DNA to protein)

## Define (LEARN):

mutation, mutant, mutagen, mutagenesis

**mutation classes** (p. 355) alteration in base sequence -alters amino acid in protein

base substitution  
deletions  
frameshift

## mutagenesis

agents which alter base sequence cause mutations, carcinogenesis

UV sun bathing, tanning bed, germicidal lamp melanin is response to damage  
benzpyrene incomplete combustion, activated by liver. Nicotine causes prolonged exposure  
nitrites color preservative in meats, convert to nitrous acid in stomach

Somatic mutations cause cancer, Germ line mutations cause birth defects.

## REPAIR:

In situ:

Thymine dimers recognized, energy in visible light breaks them apart (photoreactivation)

Excision and resynthesis:

mismatch section cut out, resynthesized, ligase closes.  
There can be a 50% chance wrong base resynthesized

