

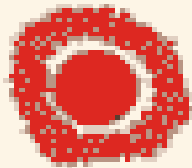
# Chapter 12 Notes

## DNA

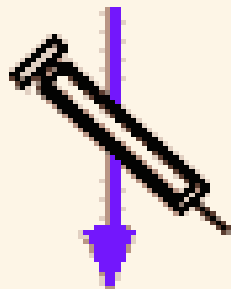


# What makes up Genes?

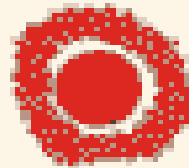
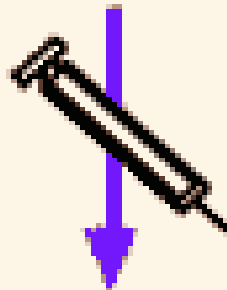
- 3 teams of scientists answered this question.
  1. Griffith – **Transformation**
  2. Avery – **DNA destroying protein**
  3. Hershey-Chase -- **virus**



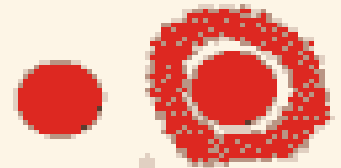
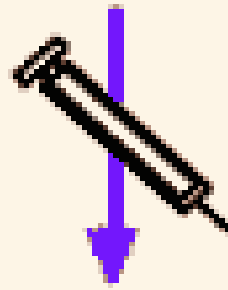
live  
S strain



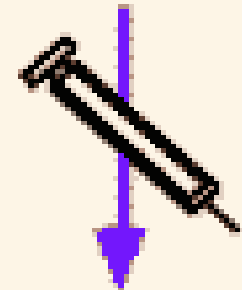
live  
R strain



heat-killed  
S strain

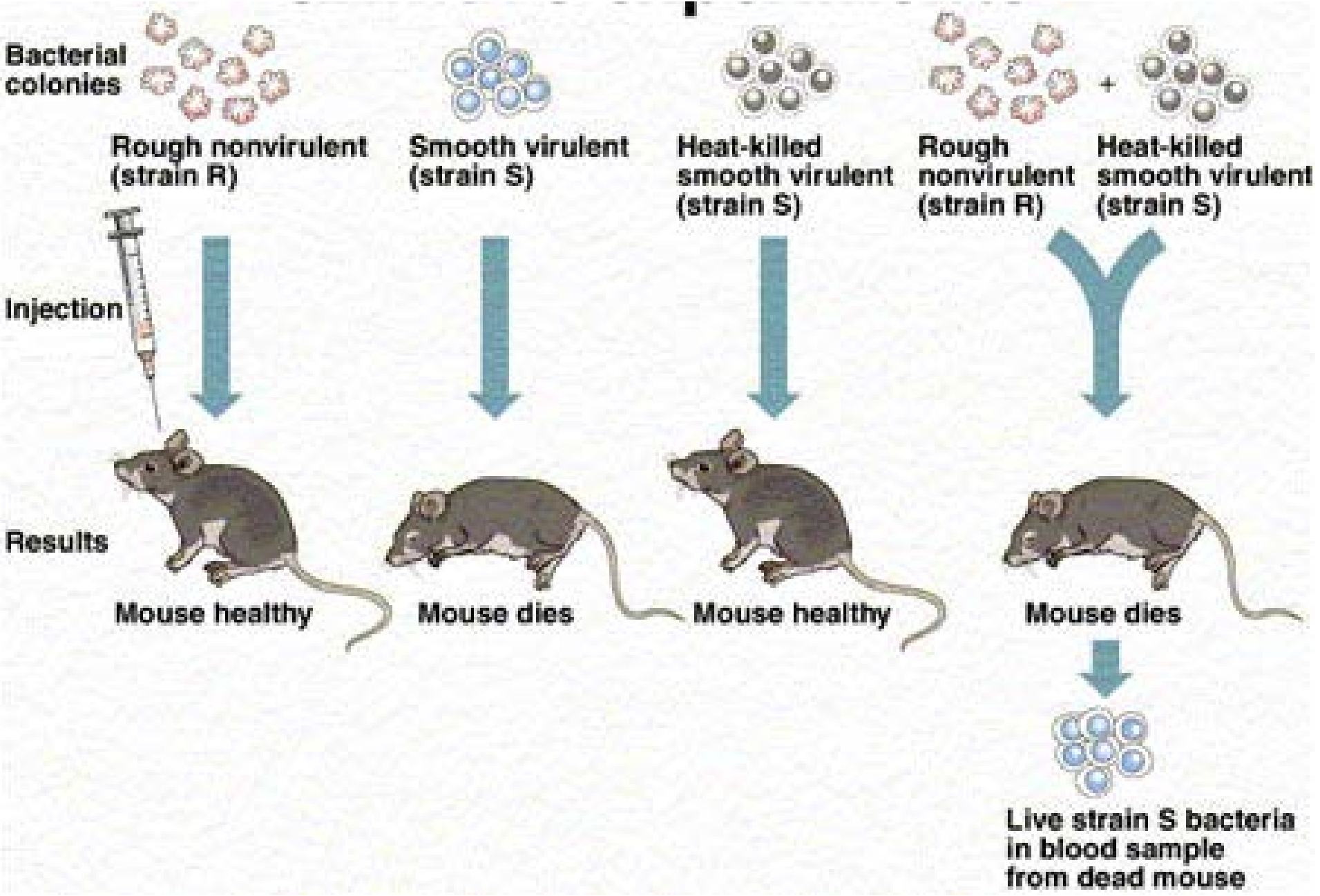


heat-killed  
S strain and  
live R strain



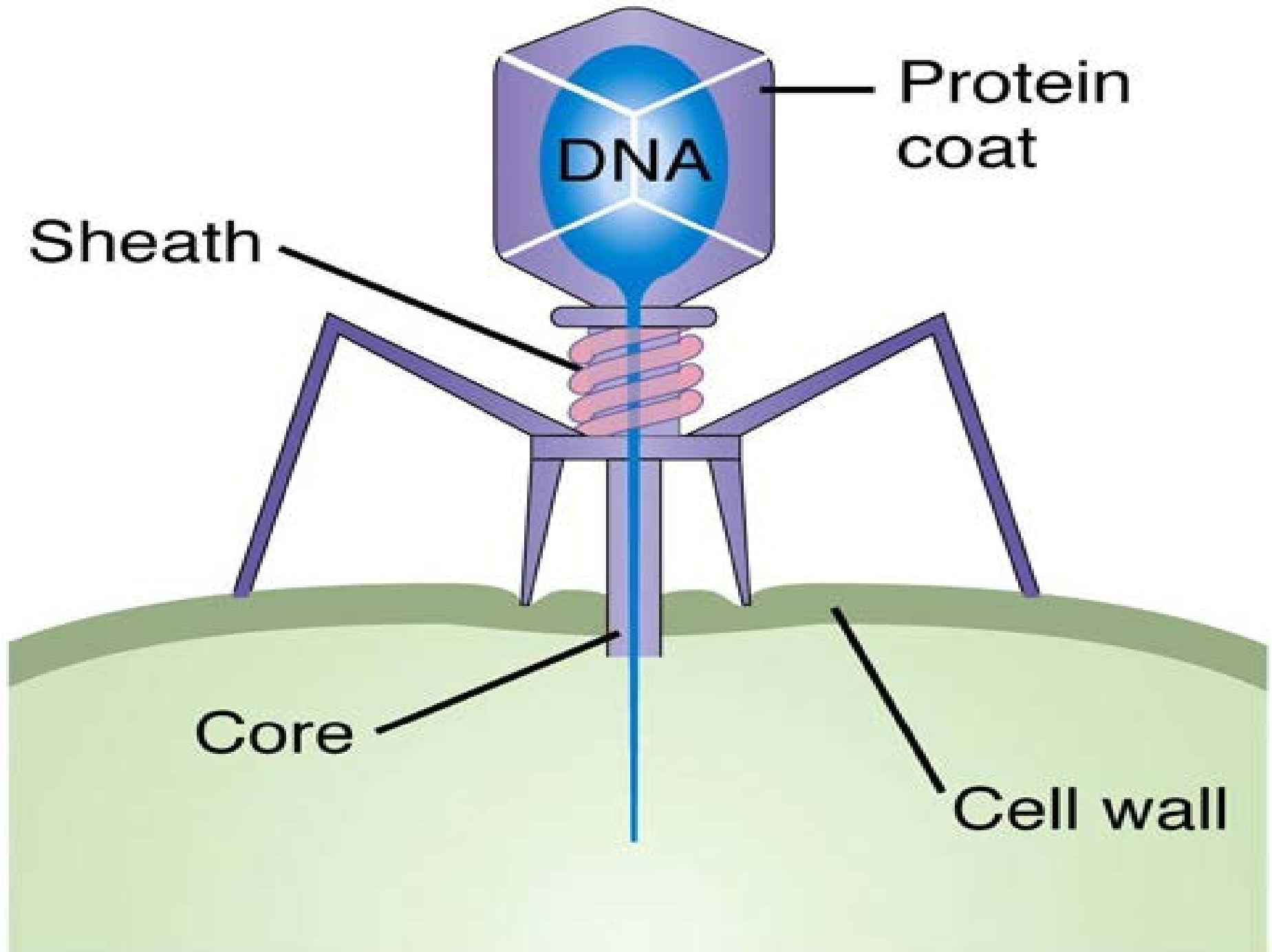
# Griffith – used bacteria

- 2 types (S and R) smooth and rough
  - Smooth – caused pneumonia (protein coat)
    - DEADLY
    - Killed the S – not deadly
  - Rough – no pneumonia (no protein coat)
    - Not DEADLY
  - S (heat killed) + R (live) → mouse died
    - Something in S got into R to Transform it into Live S



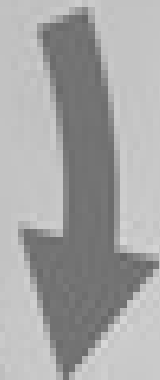
# Avery

- Same experiment as Griffith but.....
  1. Dead S + Protein destroying Enzyme + live R
    - Kills mouse
    - PROTEIN IS NOT THE GENETIC MATERIAL**
  2. Dead S + DNA destroying Enzyme + live R
    - Mouse lives (live S found)
    - DNA must of got from S into R
    - DNA IS THE GENETIC MATERIAL**

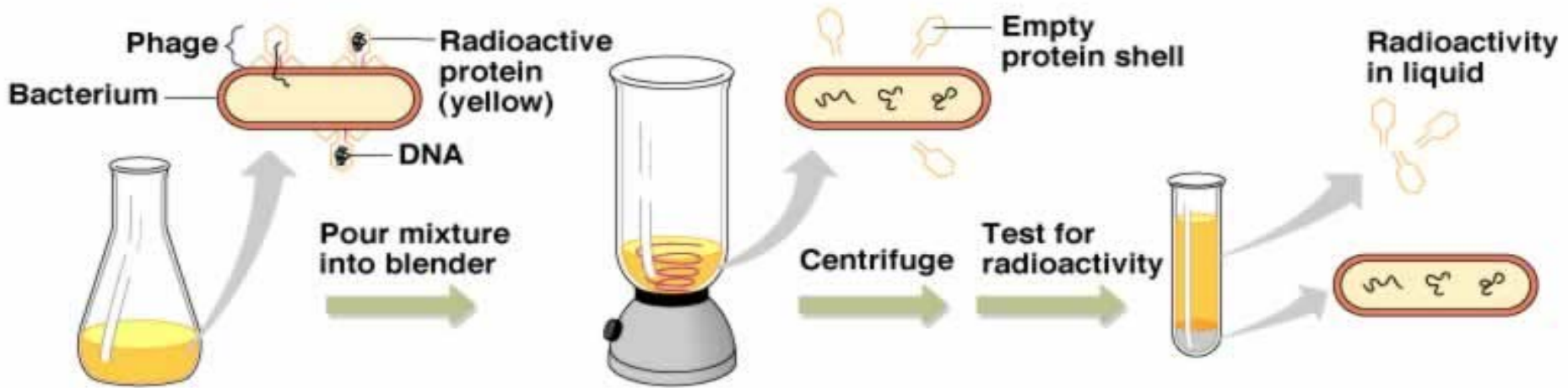








# Hershey and Chase

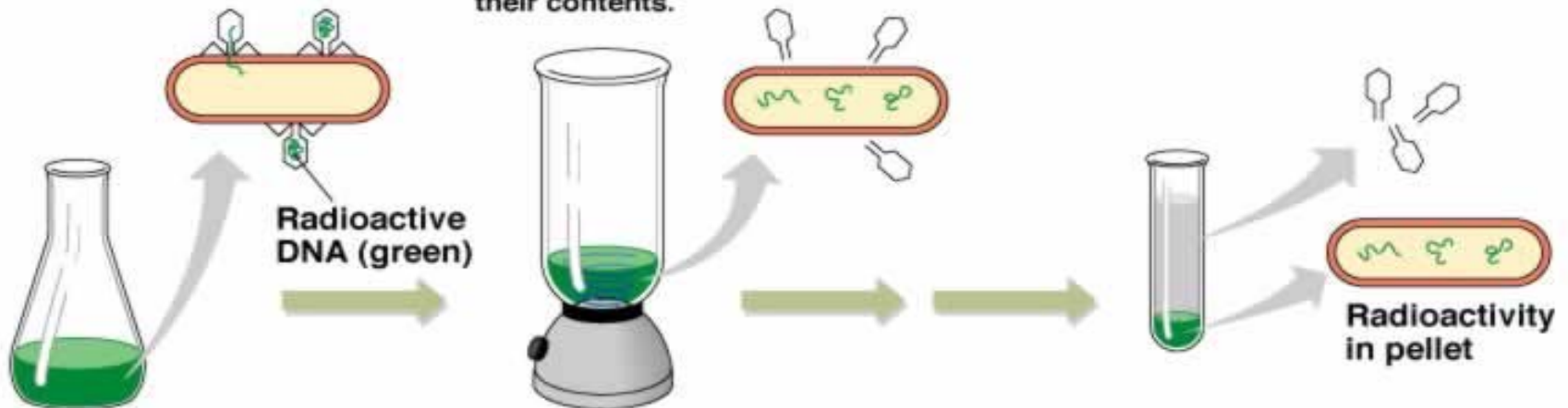


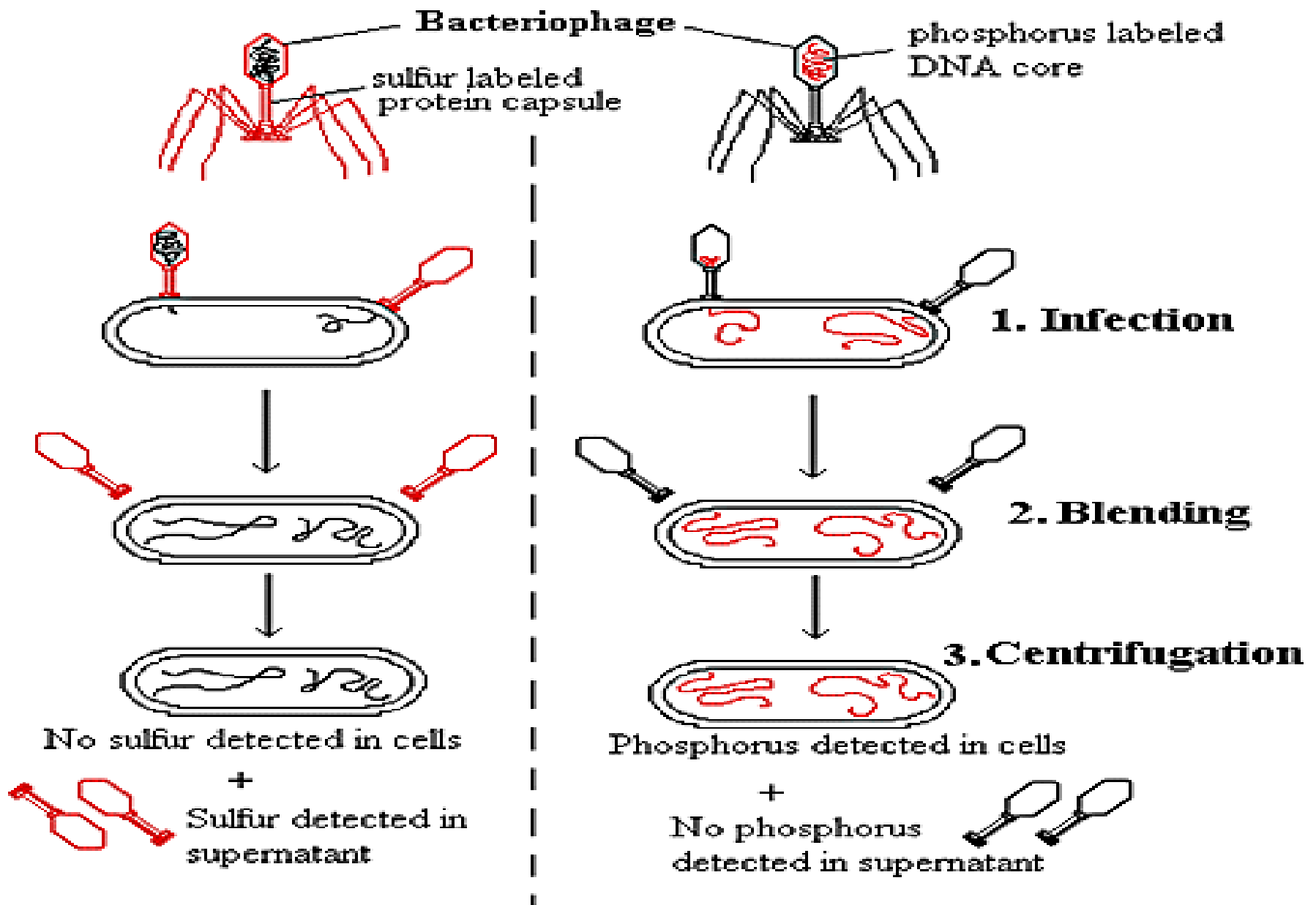
1 Mix radioactively labeled phages with bacteria. The phages infect the bacterial cells.

2 Agitate in a blender to separate phages outside the bacteria from the bacterial cells and their contents.

3 Centrifuge the mixture.

4 Measure the radioactivity in the pellet and the liquid.





## The Hershey-Chase Experiment

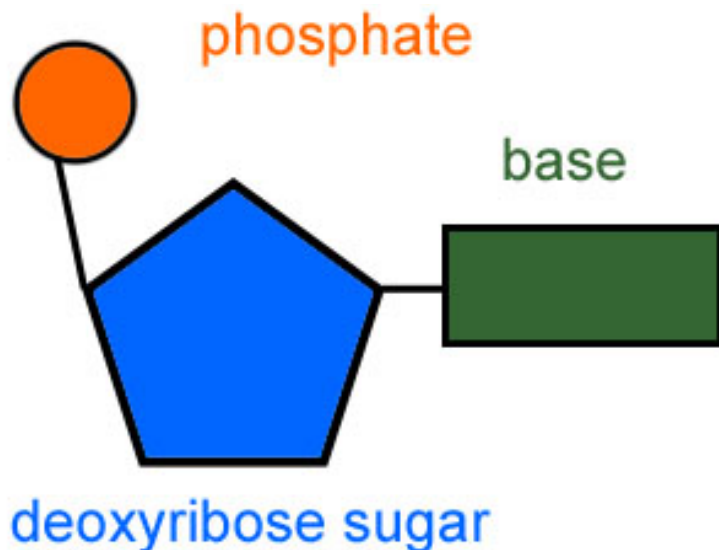
# Hershey Chase

- 2 types of viruses
  - Radioactive DNA
  - Radioactive protein coat
- What ever part gets into the bacteria cell (DNA or protein) that is the genetic material
- It was found that the bacteria cell became radioactive with radioactive DNA, not radioactive protein



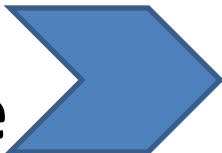
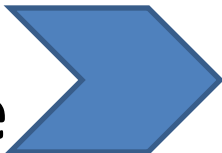
# DNA#

1. **Transfer** genes from generation to generation
2. **Code** for traits
3. Easily **copied**

Made of **NUCLEOTIDES**



## 4 BASES

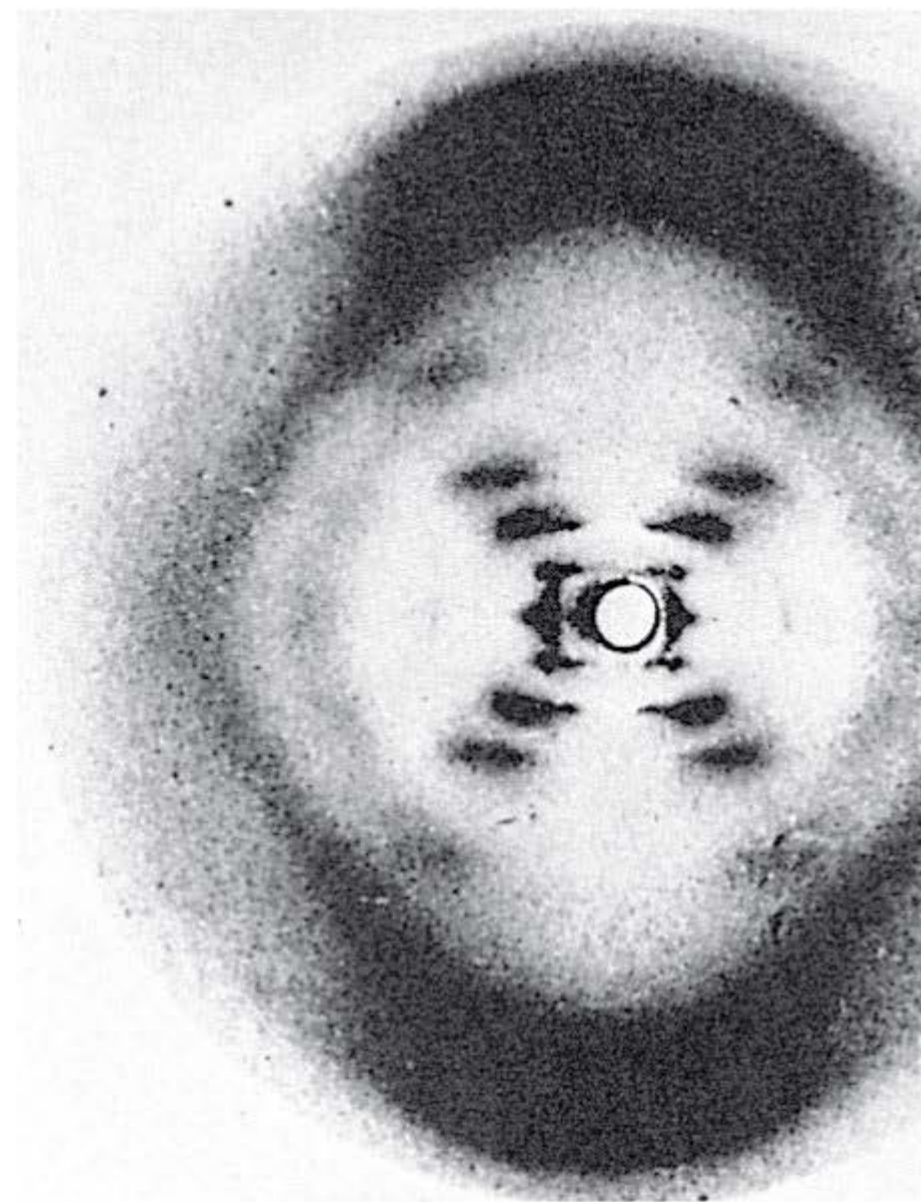
1. **Adenine**  **Purine (2 rings)**
2. **Guanine**  **Purine (2 rings)**
3. **Cytosine**  **Pyrimidine (1 ring)**
4. **Thymine**  **Pyrimidine (1 ring)**

# DNA continue#

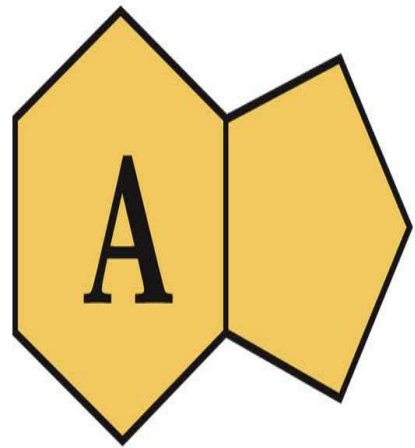
- A Gene is a code of the bases
  - ATTCCCC – code for 1 trait (brown hair)
  - ATTGGC – changes the trait (blonde hair)
- Chargaff's rule – A pairs with T  
C pairs with G
- Rosalind Franklin – X-ray diffraction picture
  - DNA in an X pattern



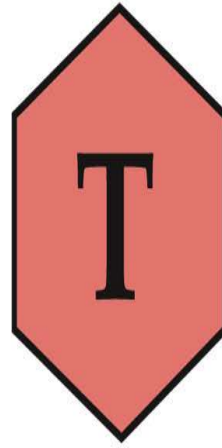
**Rosalind Franklin**



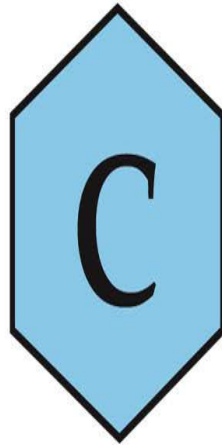
**Franklin's X-ray diffraction  
photograph of DNA**



=



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Purines

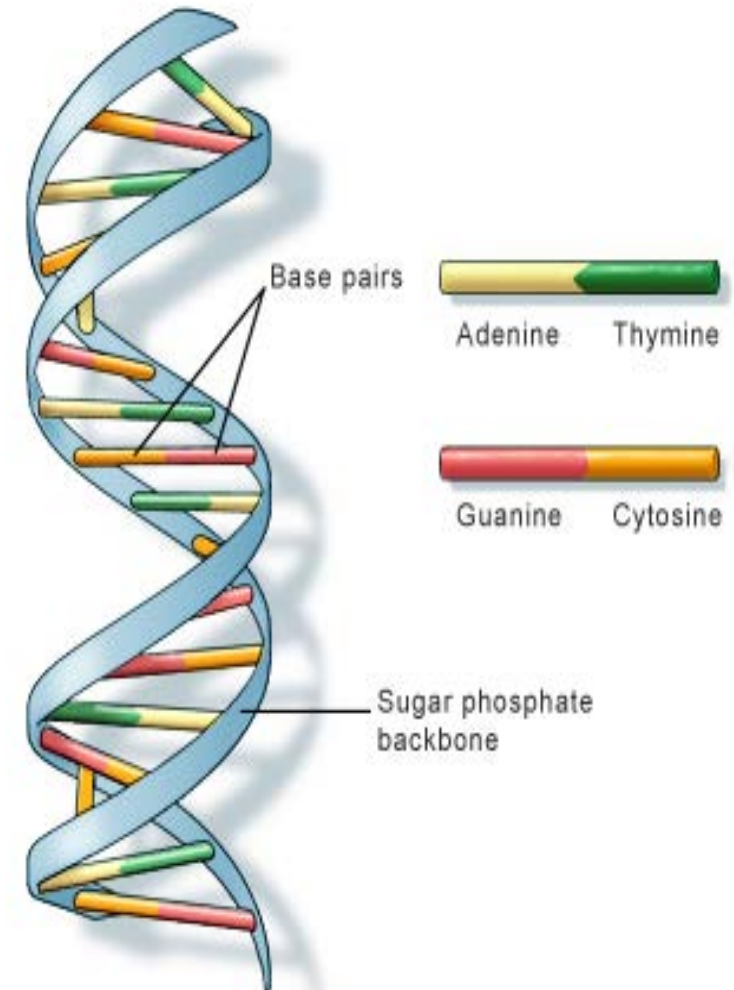
= Pyrimidines

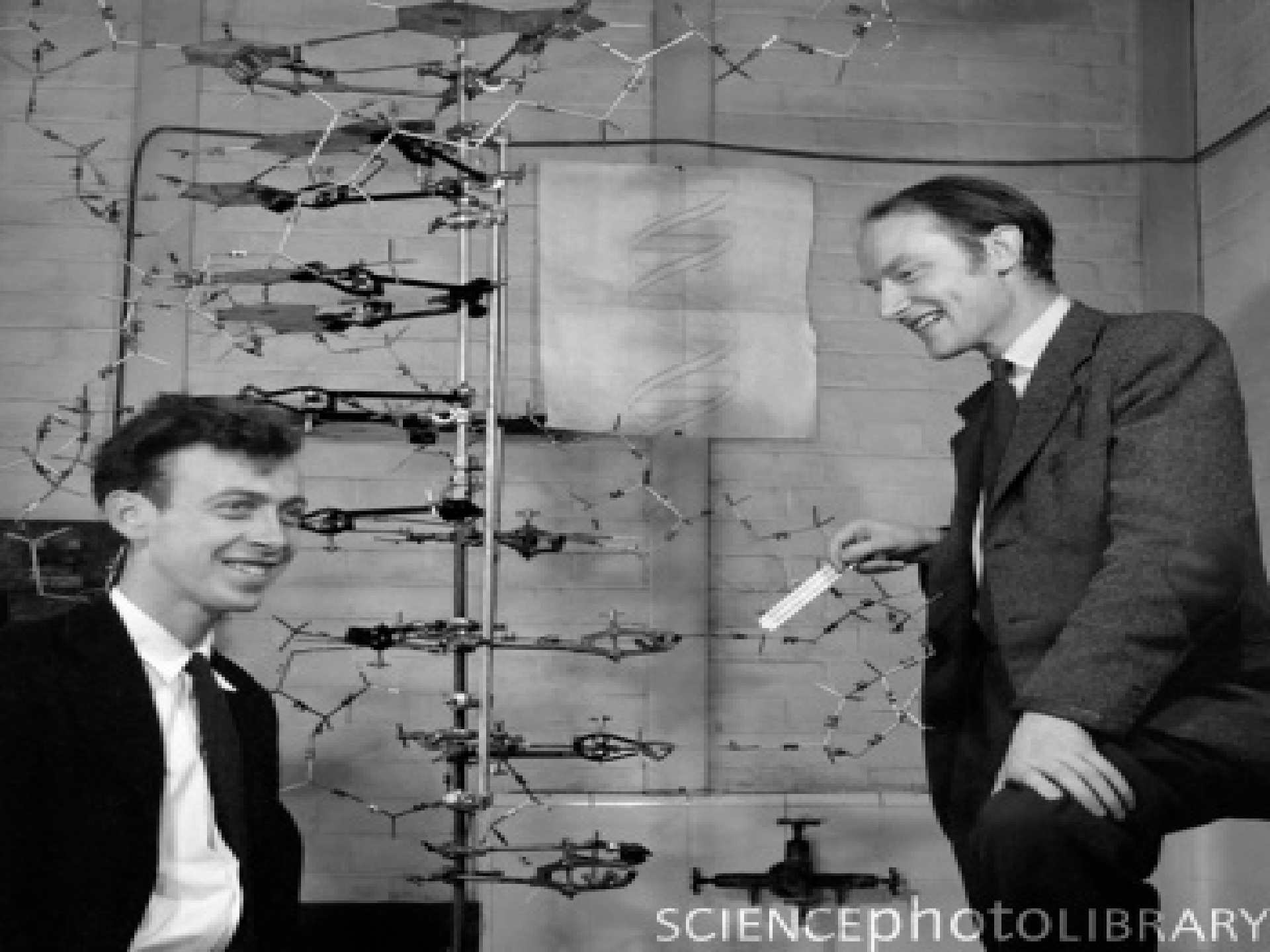




# Watson and Crick#

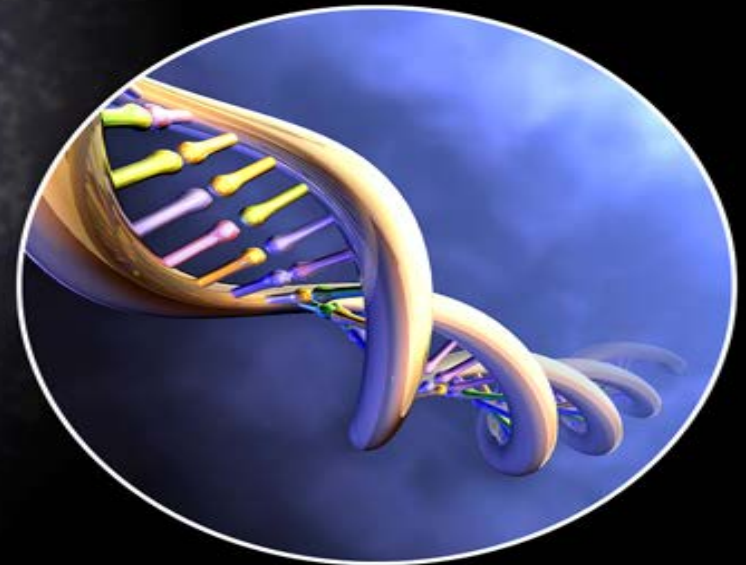
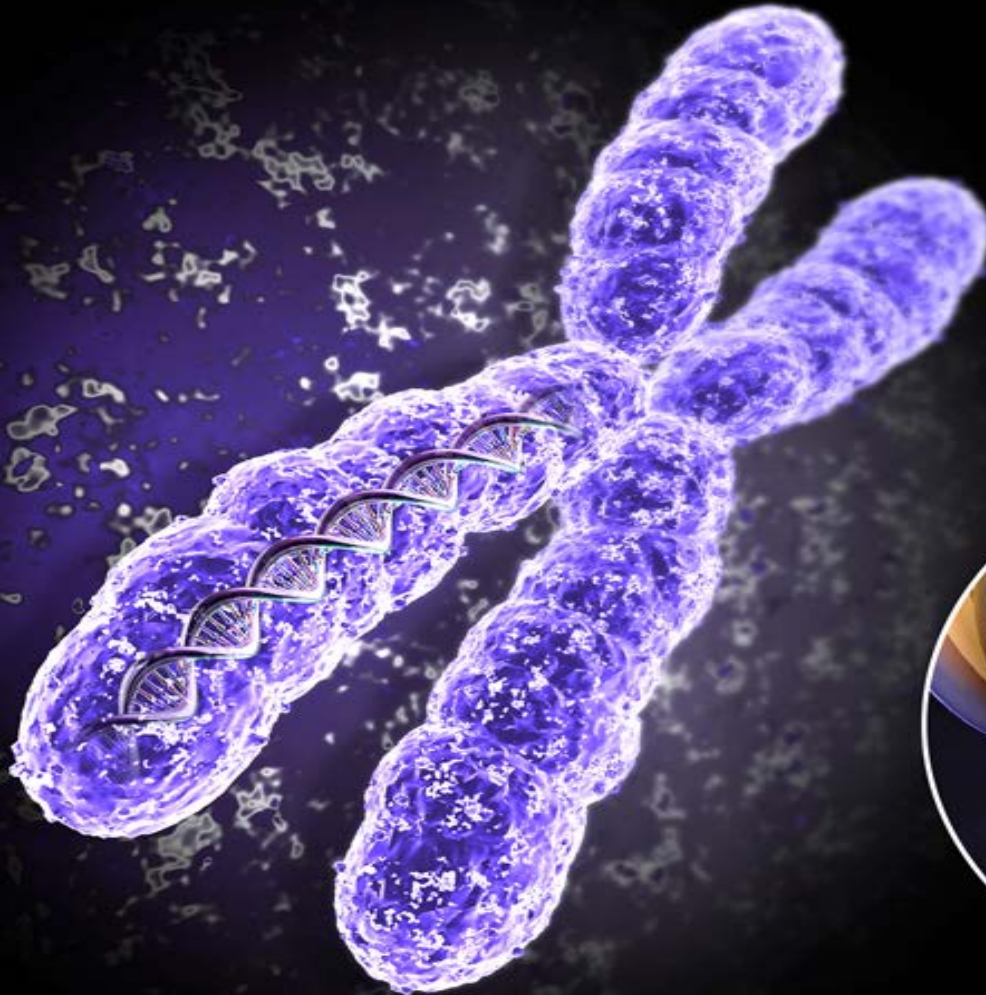
- Put it all together in a model
  - DNA is a double helix (Franklin's picture)
  - 2 strands with bases facing each other
    - Bases pair up (Chargaff's rule)





SCIENCEPHOTOLIBRARY

# Chromosomes and DNA Replication



# Chromosomes

- DNA wound up around proteins called histones make up chromosomes
- Different organisms have different number of chromosomes
  - Humans have 46
  - Fruit flies have 8
  - Giant Sequoias have 22



# Chromatin and Condensed Chromosome Structure

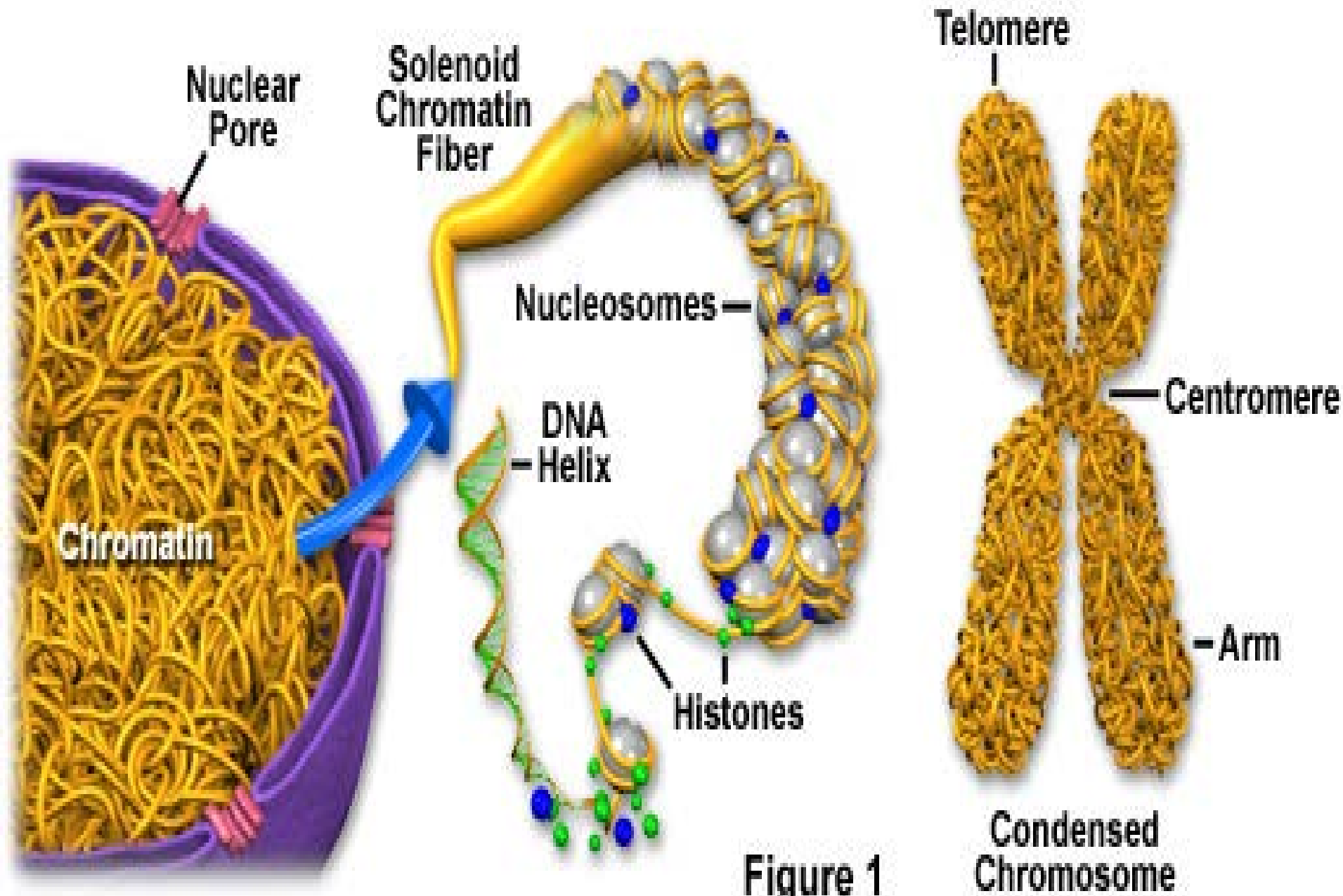


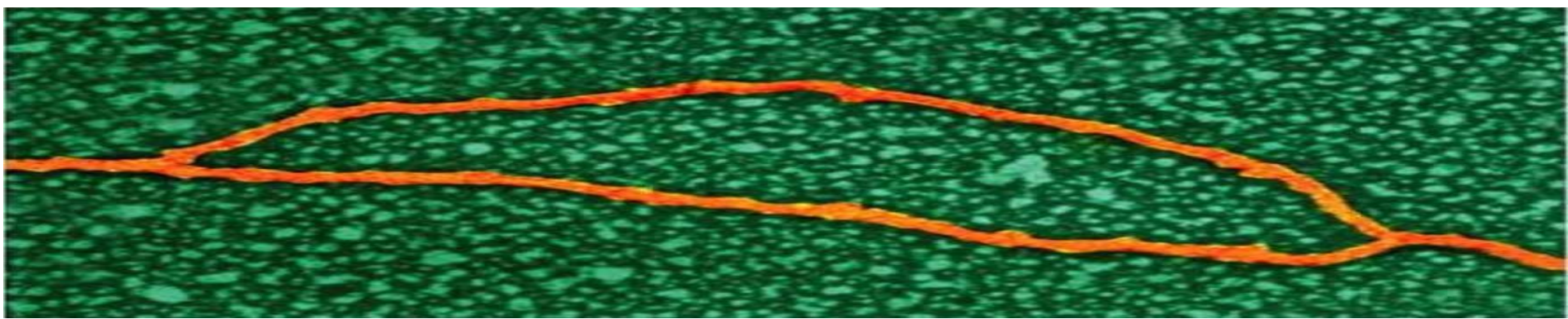
Figure 1

Condensed Chromosome



# DNA Replication#

- Make an exact copy of the DNA
- Separate the two sides and copy both
  - Each new copy have one old and one new strand
  - Eukaryotes – does thousands of “Replication forks” at a time
  - Prokaryotes do 2 going in opposite directions

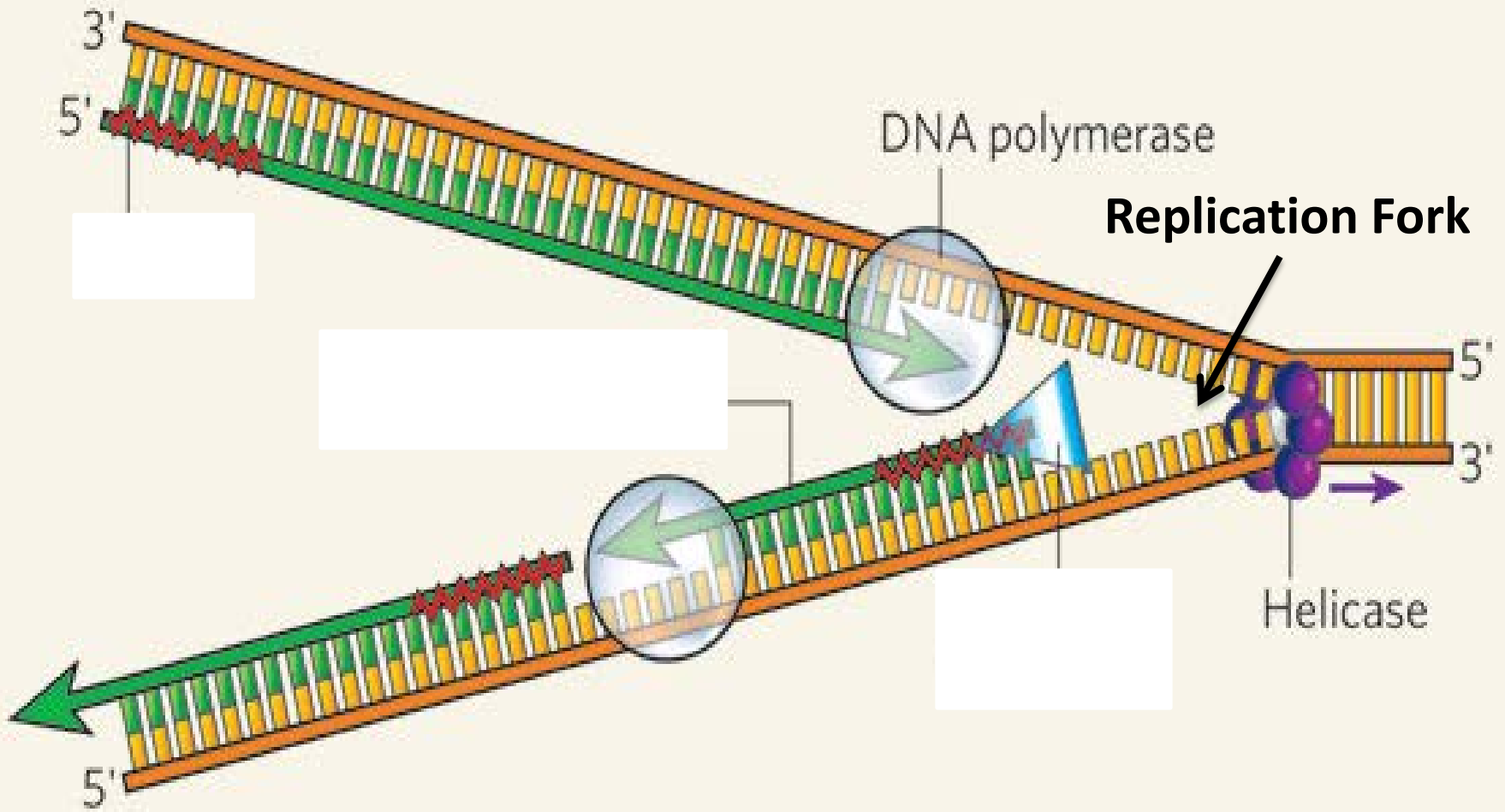


# DNA Replication Cont.#

- DNA Helicase **unwinds** a portion of the DNA
- DNA polymerase goes along single strand and **adds complimentary base** to each single base
  - Old DNA strand serves as a template for the new strand
- DNA Polymerase goes back and **proofreads** new double strand of DNA
  - From **One in a million** to **one in 100 million ERRORS**

Leading strand

#



Replication Fork

Helicase

Lagging strand



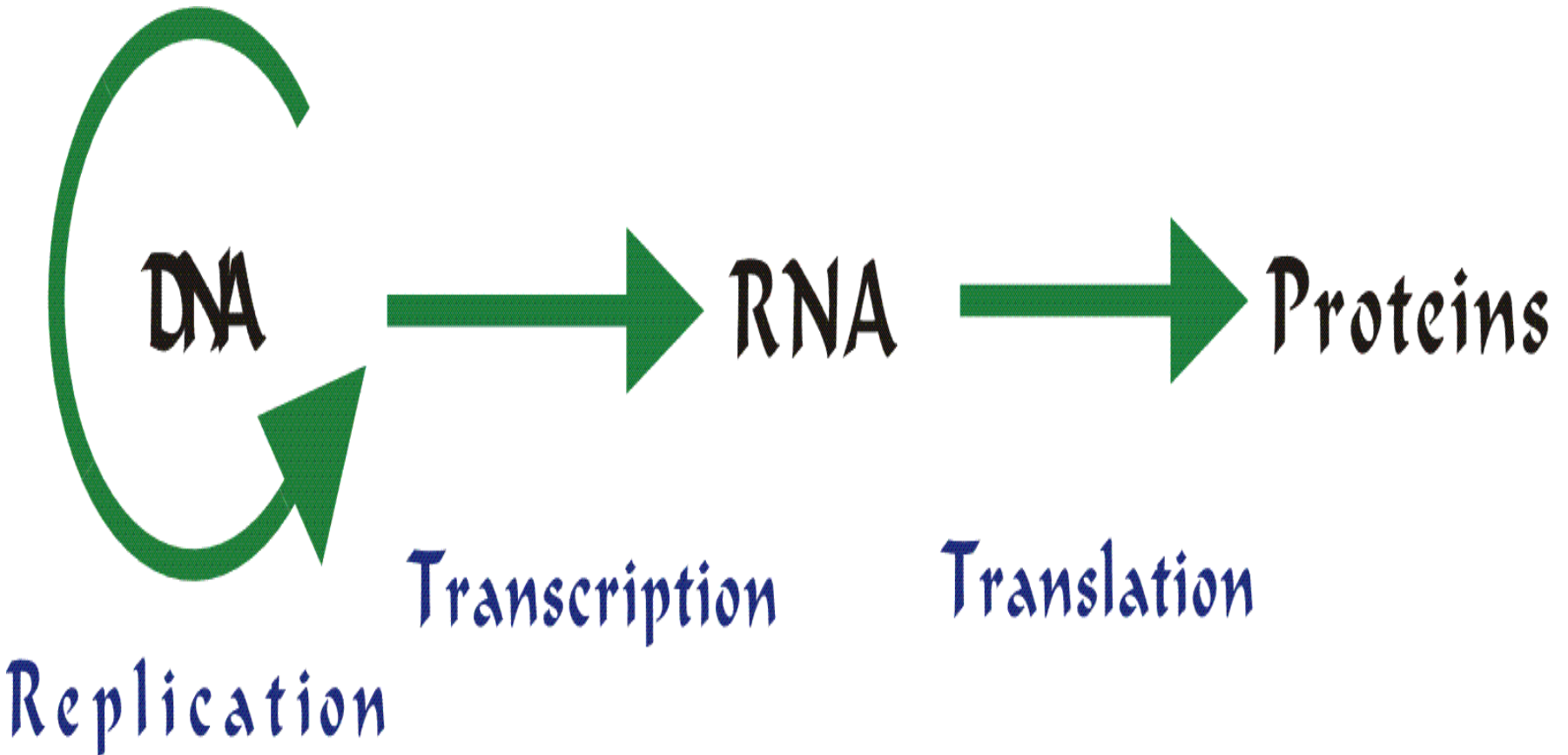
# RNA and Protein Synthesis

## **2 Steps to make a Protein from DNA**

**1. Transcription**

**2. Translation**

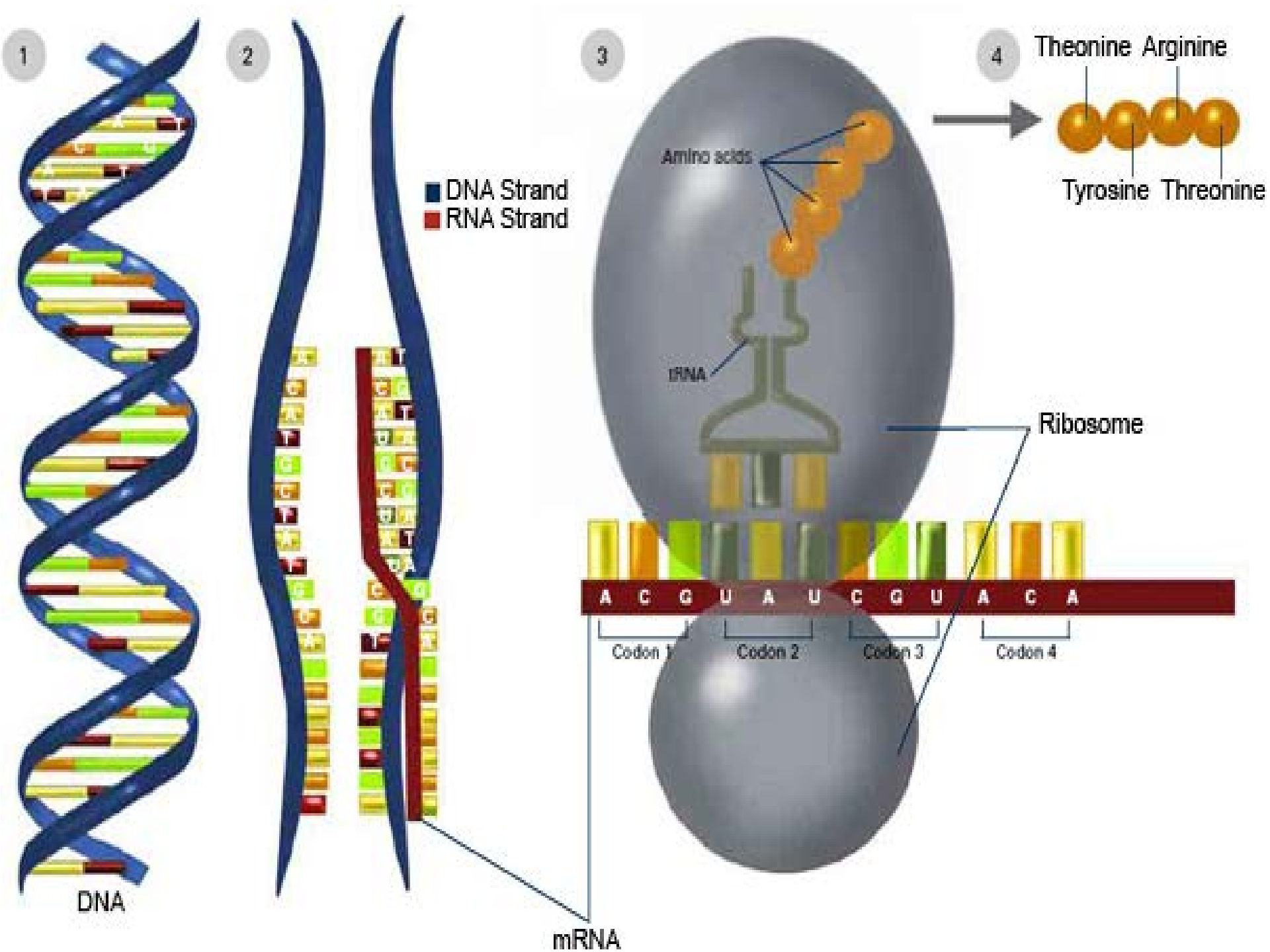
# Central Dogma Theory



- **STOP AND LOOK AT THE CENTRAL DOGMA NOTES (OVERHEAD) ON MY WEBSITE**
- **THE NOTES BELOW I DID NOT USE IN CLASS**







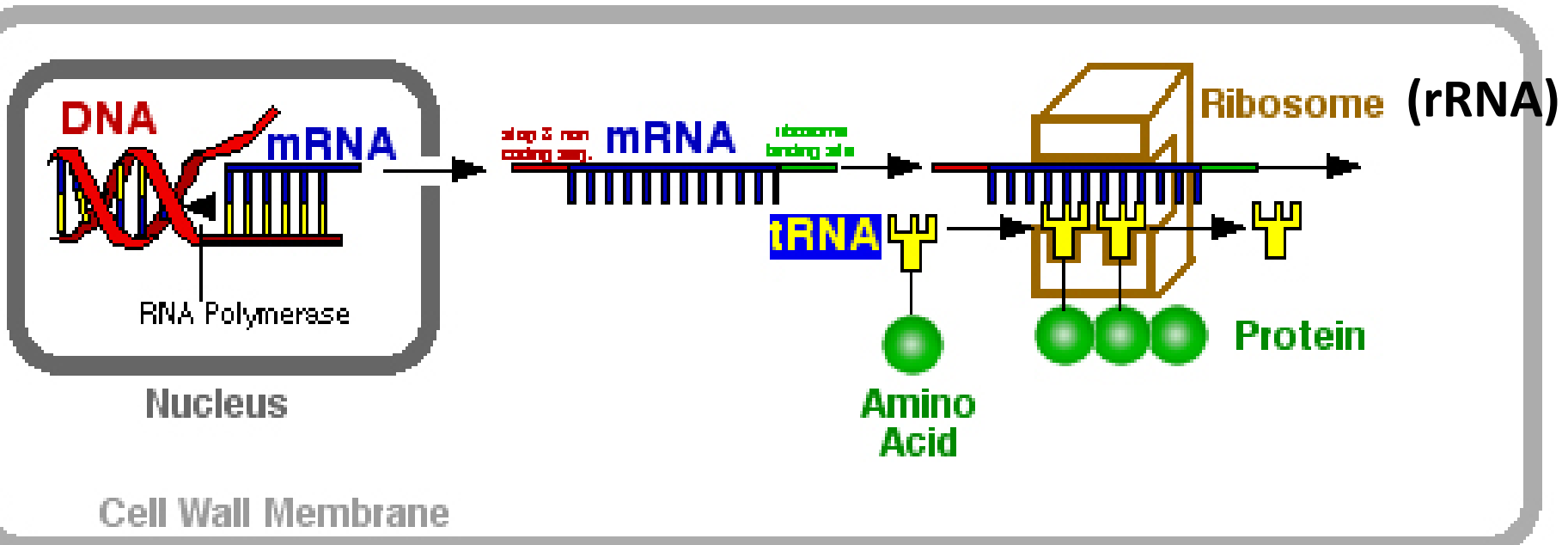
# RNA

- 3 types
  1. mRNA (DNA copy) – messenger
  2. rRNA (Ribosome) – ribosomal
  3. tRNA (AA to mRNA) – transfer

TRANSCRIPTION

TRANSPORT

TRANSLATION

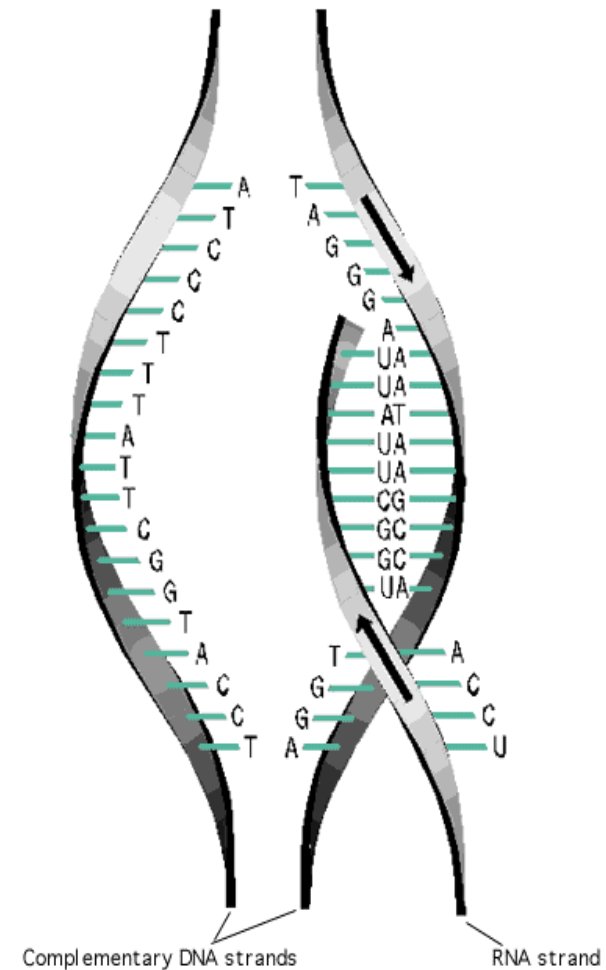


- **3 Differences from DNA**

1. **Nucleotide (uracil not thymine)**

1. **Sugar (ribose not deoxyribose)**

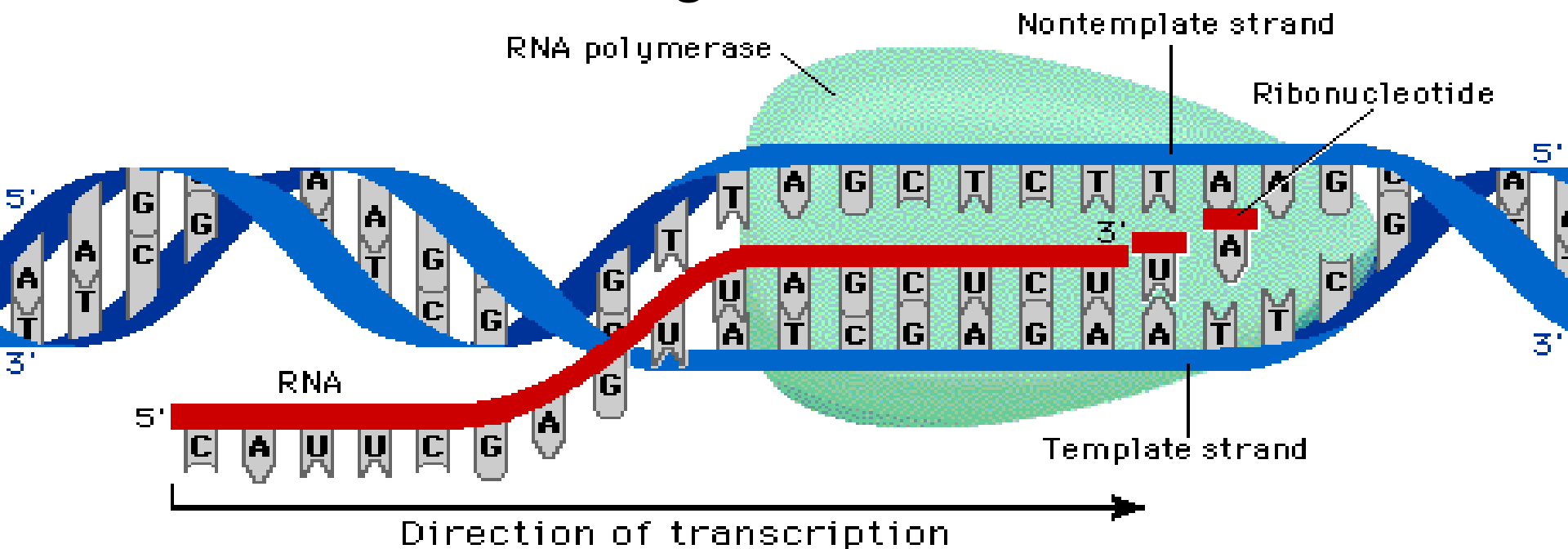
1. **Single strand not double strand)**





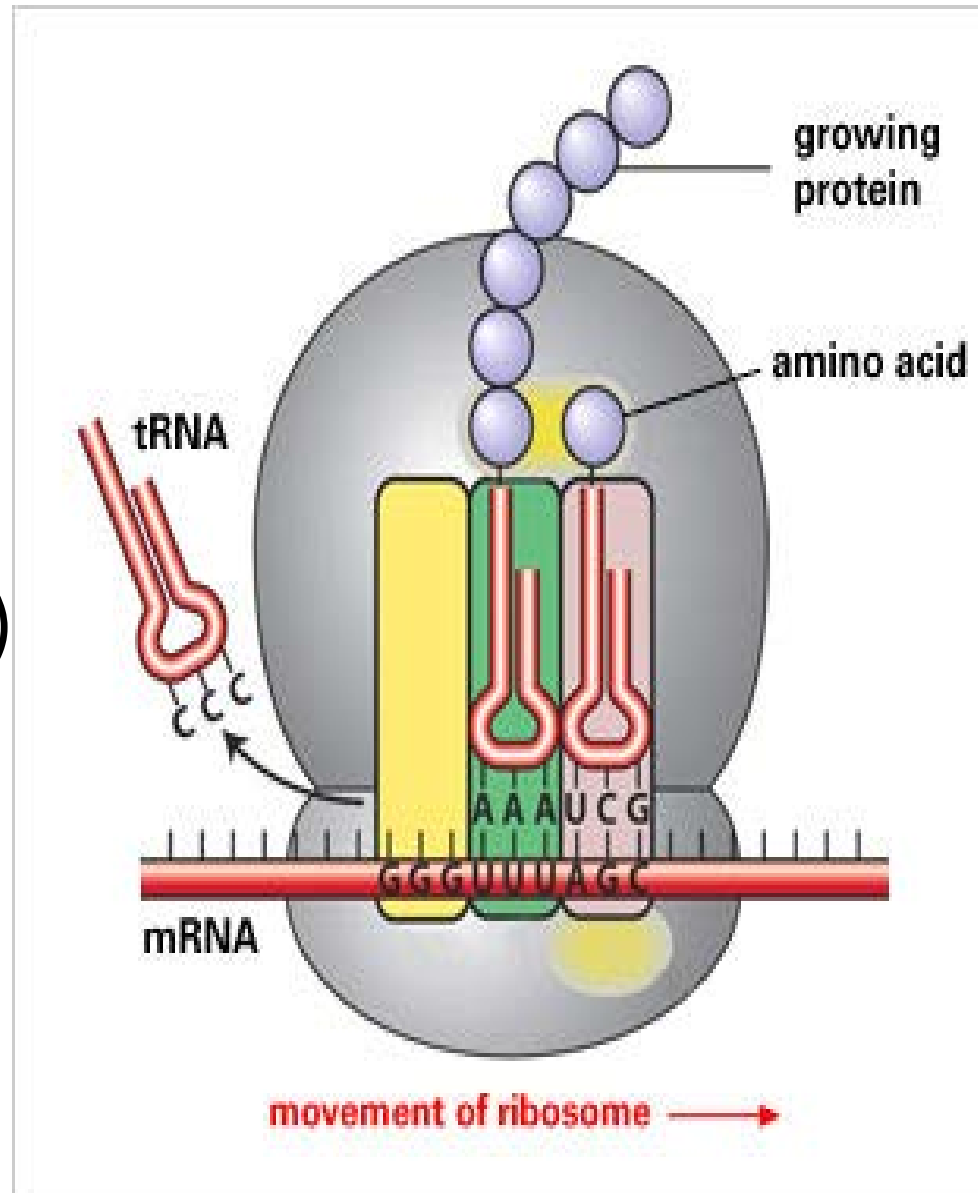
# Transcription

- RNA Polymerase binds and unwinds DNA
- RNA Polymerase moves along one DNA strand
  - Adds RNA nucleotide bases complementary to DNA – moves along DNA

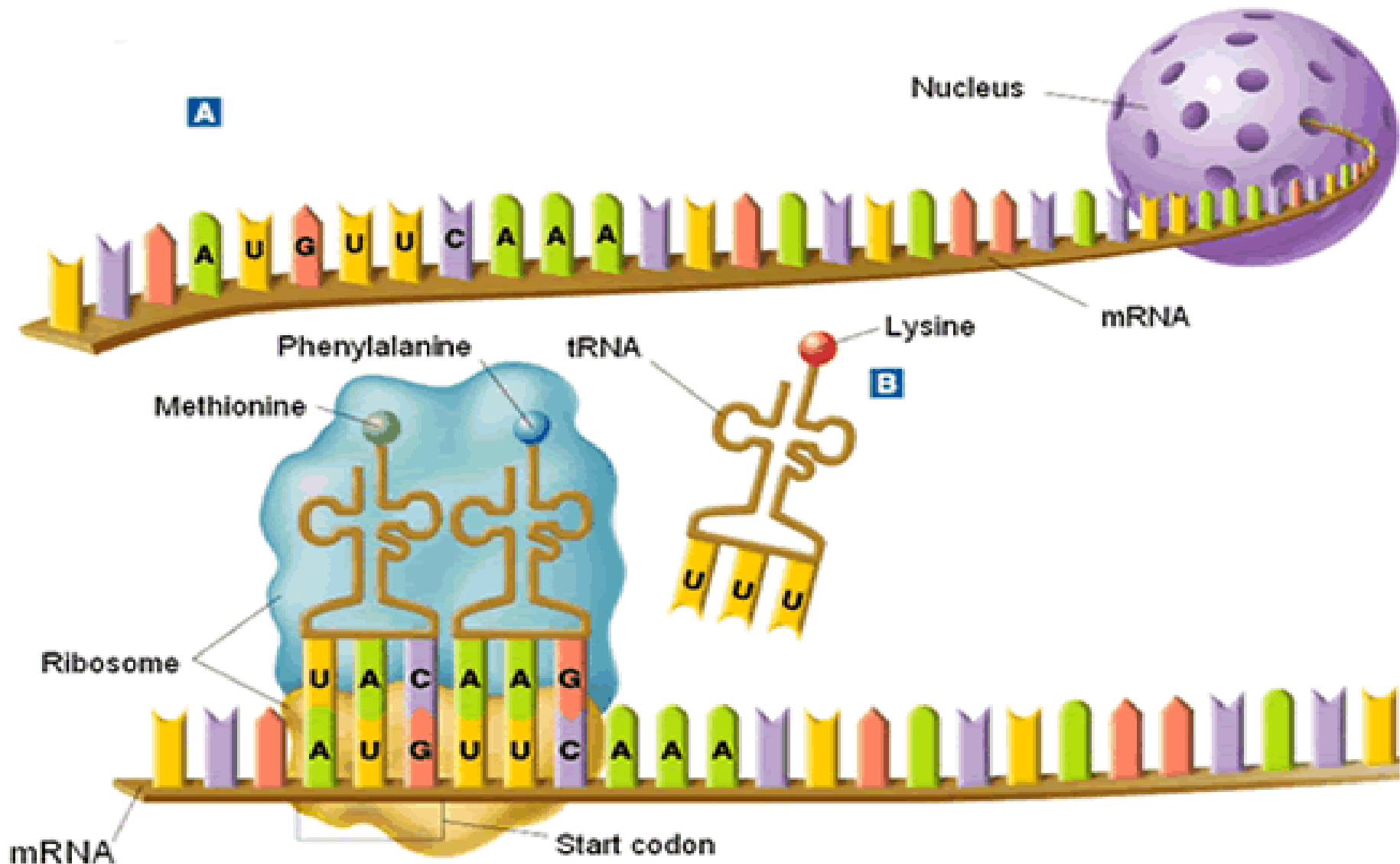


# Translation

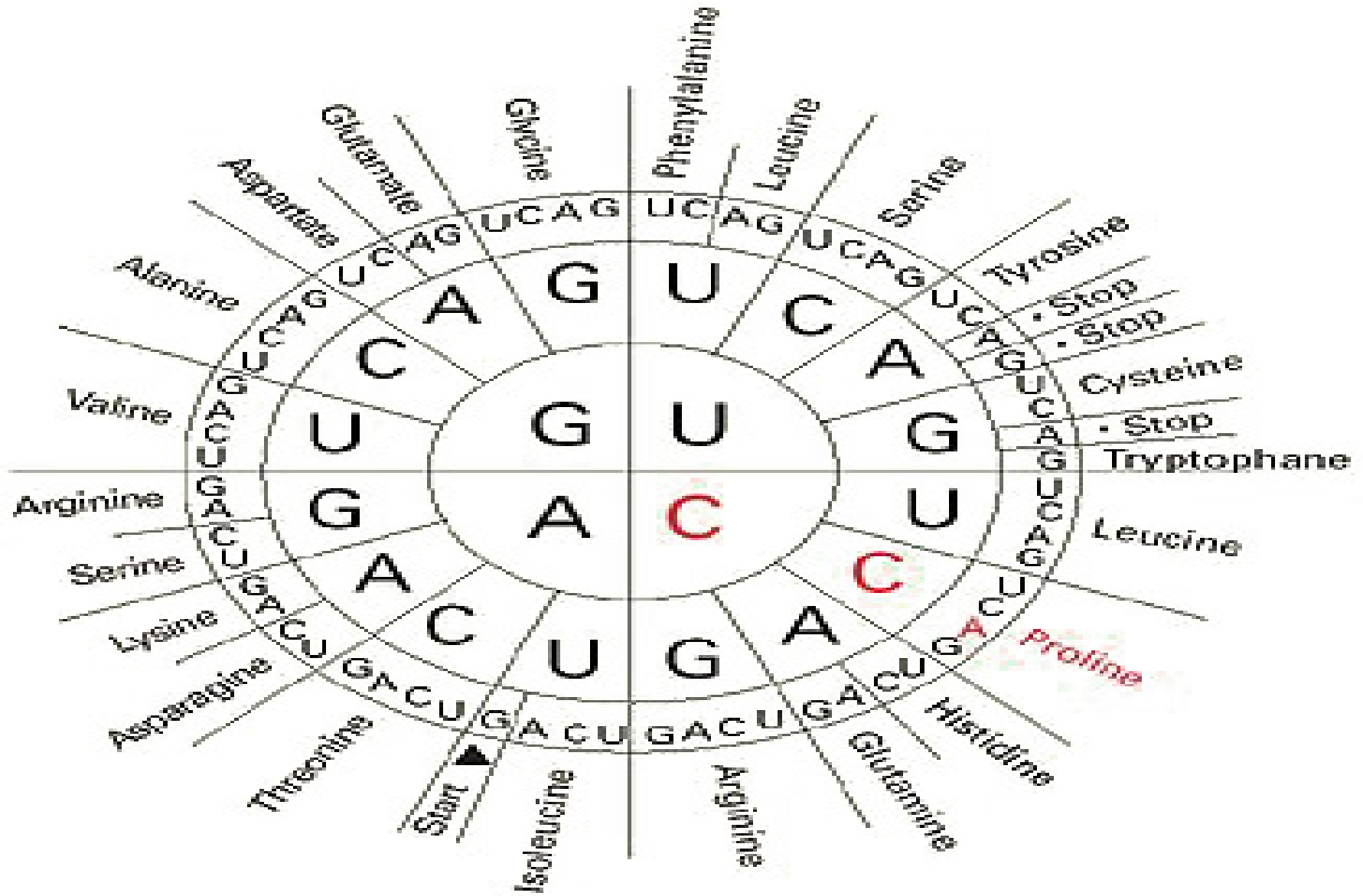
- mRNA used as a template by Ribosome
- Ribosome pairs mRNA codon (3 bases) with a tRNA anticodon (3 complimentary bases)
- tRNA has a specific Amino Acid for each codon



# Transcription



# The Genetic Code Page 303



# Using Page 303 find the Amino Acid

1. CCC
2. AUA
3. CCA
4. AAC
5. UUC
6. UAC

# From DNA find Amino Acids

DNA: TTCAGCCCGAATTTACT

mRNA:

Amino A:

# Mutation

1. Point Mutation: occur at a single point
  1. Substitutions
  2. Insertions
  3. Deletions
2. Frame-shift Mutation: Caused by an insertion or deletion







