DNA: The Molecule of Heredity

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📖 Name the molecule that **ultimately determines** organisms traits.

DNA

📖 How does DNA **achieves** its **control**?

- DNA achieves its **control** by determining the **structure** of proteins.

- Recall: Structure of proteins determines its ***function***.

📖 Why are **enzymes** important to organisms?

- Enzymes are critical for an organism's function because they **control** the **chemical reactions** needed for life.

➔ Example: food digestion

📖 Therefore, define ***DNA***.

deoxyribonucleic acid

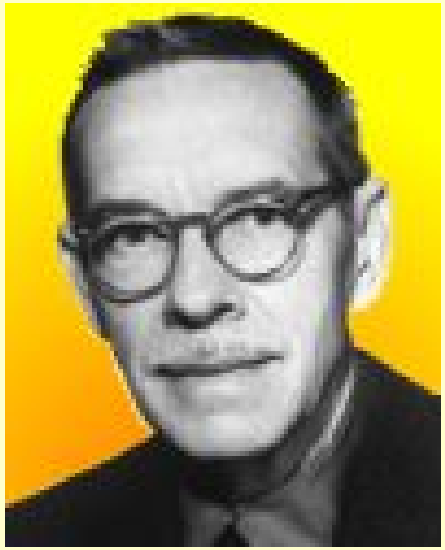
➔ The complete instructions for manufacturing **<u>all</u>** the **proteins** for an organisms.

DNA as the genetic material

📖 In the early 1950s, how did scientists think genetic material passed from generation to generation?

❖ Many scientists believed that **proteins** was the genetic material because the structure of these large molecules was so varied.

📖 Name the **2** scientists who performed experiments for determining which molecules are responsible for passing genetic traits.



Alfred Hershey

Martha Chase

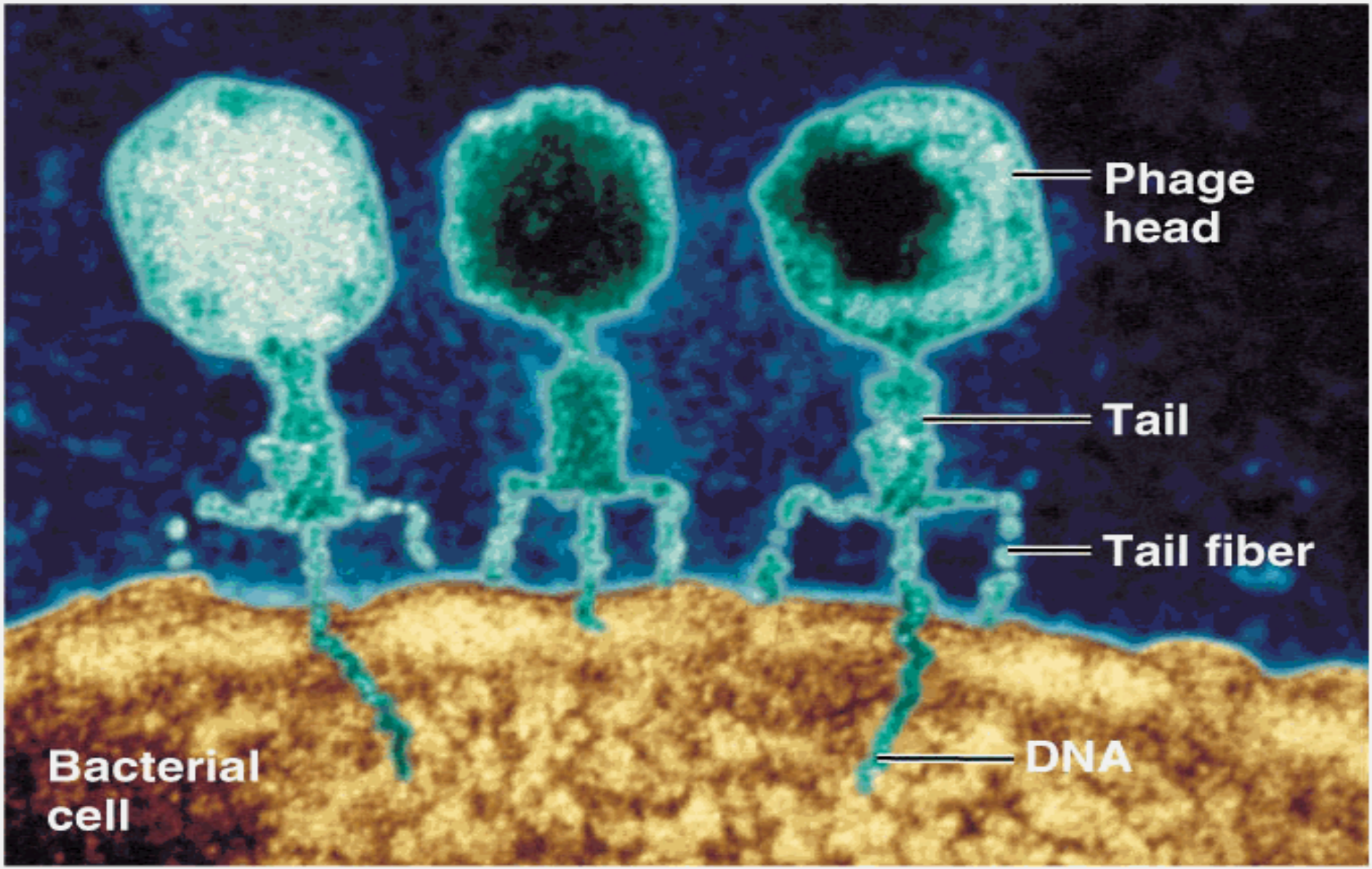
📖 Describe (**list**) the steps and results of their investigation.

Hershey and Chase created **2** different type of viruses.

1.) **1** type had ***radioactive DNA*** and the other type had ***radioactive protein***.

2.) Each type of virus **infected** a **different bacteria** culture.

3.) **Only** the ***DNA*** entered the bacteria and produced **new *viruses*** (**NOT the proteins**).

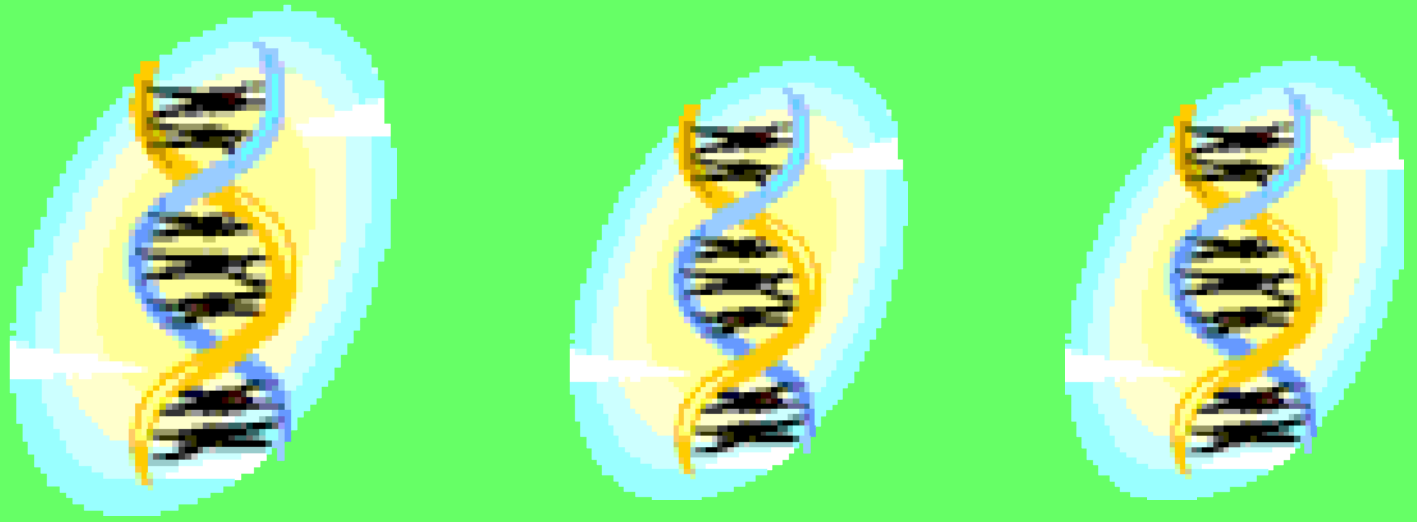


(a) T2 and related phages use their tail pieces to attach to the host cell and inject their genetic material (TEM).

DNA: The Structure

📖 Name the **polymer** of DNA molecules.

❖ Recall that DNA is a **polymer** made of **repeating subunits** called ***nucleotides***.



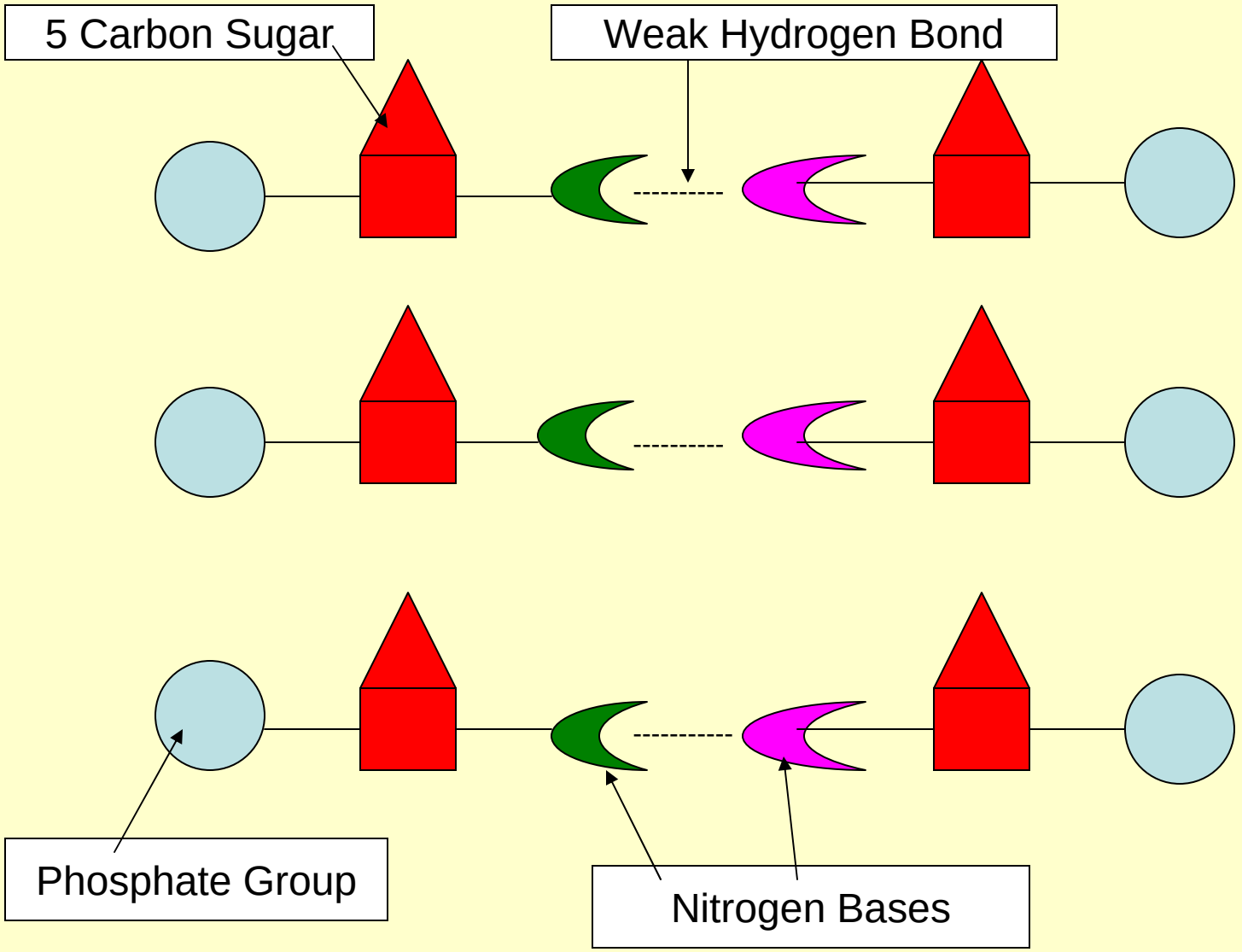
📖 How **<u>many</u> parts** does **each nucleotide** contain? Name them.

1.) simple sugar…***deoxyribose***

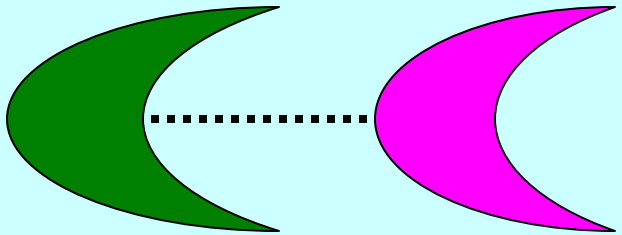
2.) a phosphate group

3.) nitrogen bases

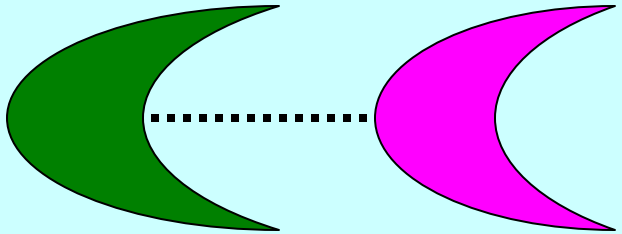
🗣Need to understand that…DNA



📖 How **<u>many</u> nitrogen bases** are in each nucleotide structure? Name them.



Adenine Thymine



Cytosine Guanine

🗣Need to understand that…

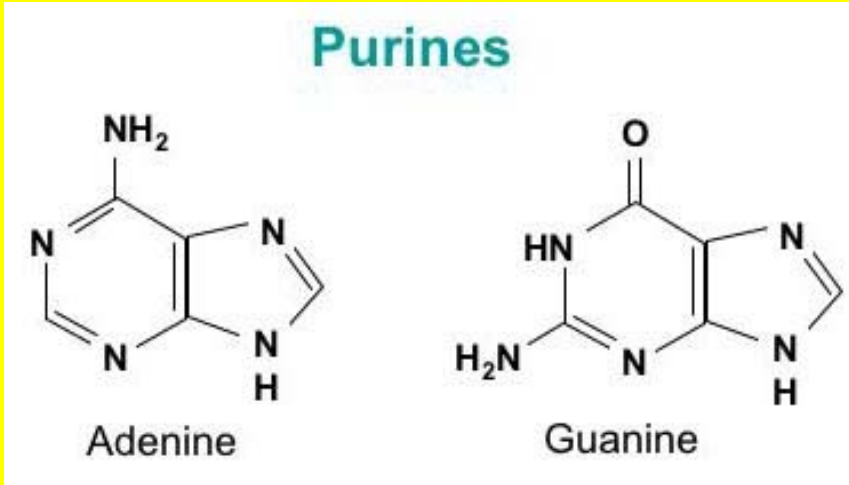
- Adenine and guanine are **double** ringed structures called…

purines

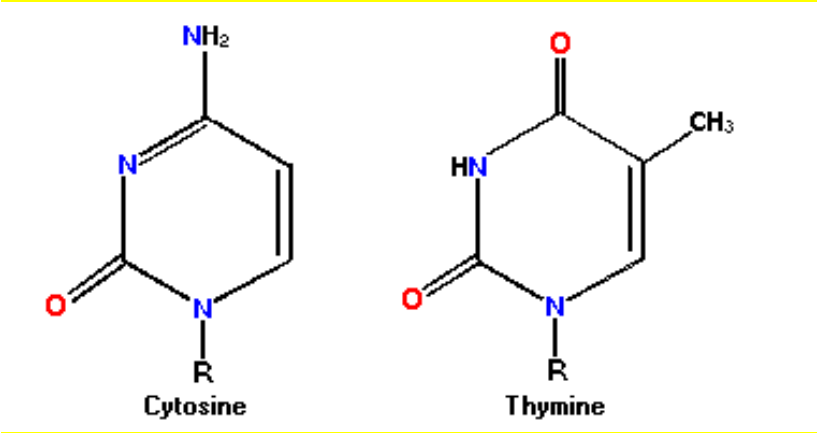
- Guanine and cytosine are **single** ringed structures called…

pyrimidines

purines

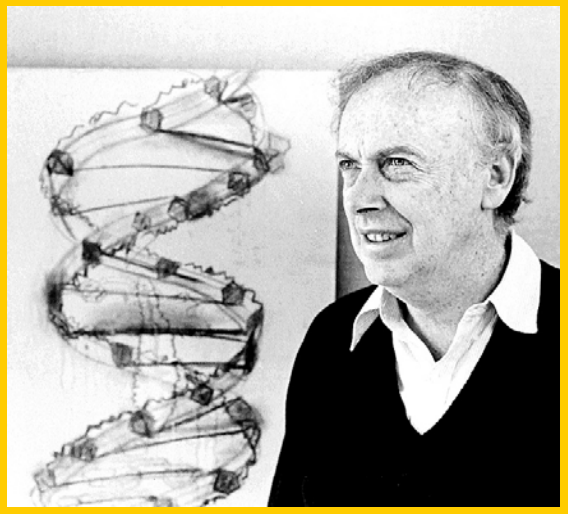


pyrimidines

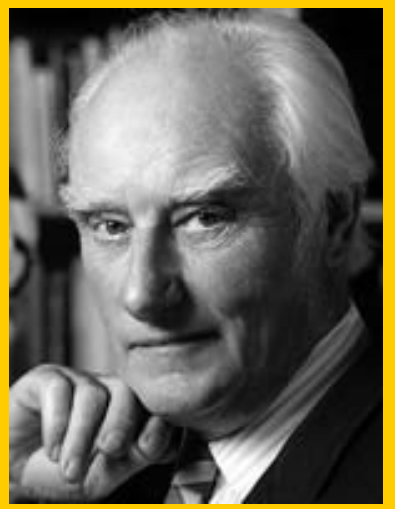


DNA: The Structure

📖 Name the **<u>two</u> scientists** who published a letter in a scientific journal in 1953.



James Watson



Francis Crick

📖 Describe the **findings** of the letter.

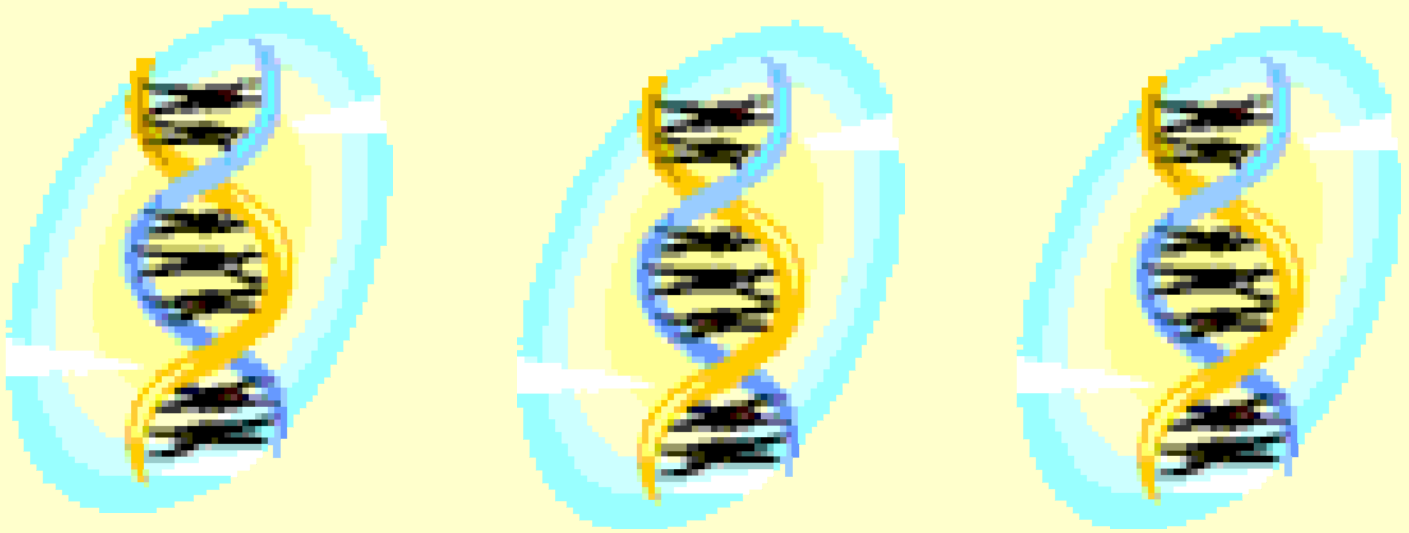
- Watson and Crick proposed that DNA is made of <u>2</u> chains of ***nucleotides*** held together by **nitrogen bases**.

 Name the **bond type** that is responsible for holding 2 strands of DNA together.

weak hydrogen bonds

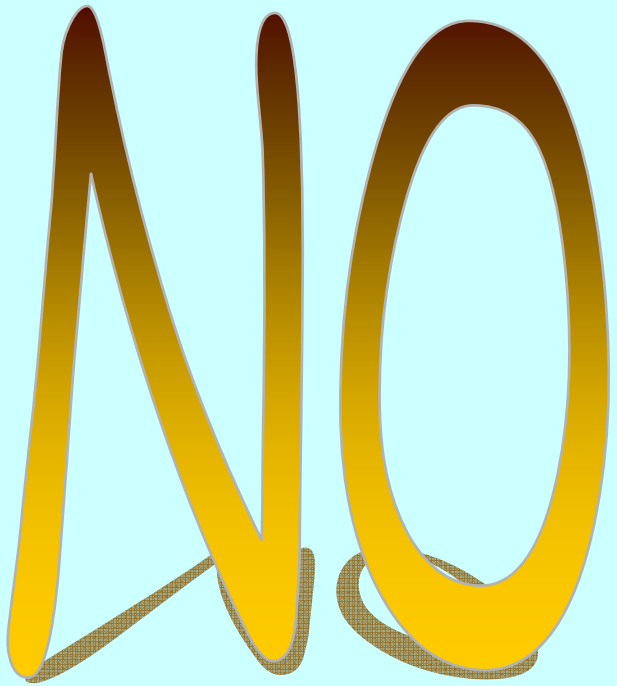
📖 What **common name** is given to describe the shape of 2 DNA molecules?

double helix



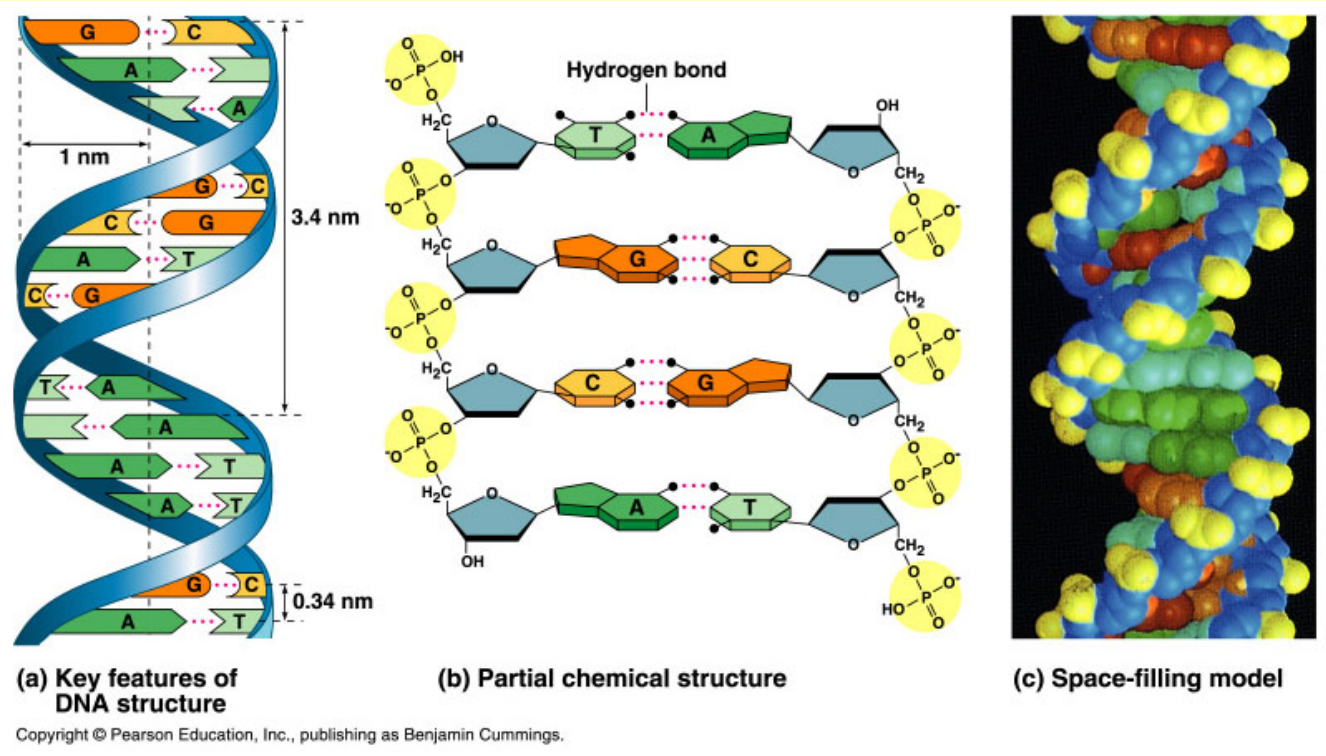
The importance of nucleotide sequence.

- Does the 4 types of nitrogen base pairs **differ** in various organisms?



🗣 Need to understand that…

- The **<u>sequence</u>** of the 4 nitrogen bases is ***responsible*** for the genetic variation among different organisms.



📖 How are nucleotide sequences **important** to scientist when studying species?

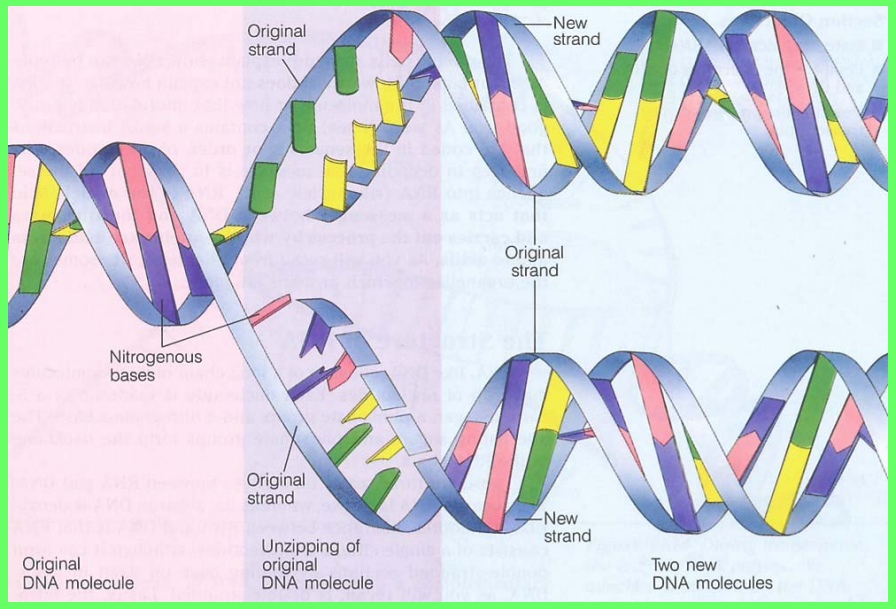
- Scientists use nucleotides sequences to study the ***evolutionary relationship*** among organisms.

- In order to determine whether **2** people are ***related*** and to ***identify*** bodies of crime victims.

Replication of DNA

📖 Define ***DNA replication***.

❖ ***DNA replication*** is the process in which chromosomal DNA is **<u>copied</u>** before cell division.

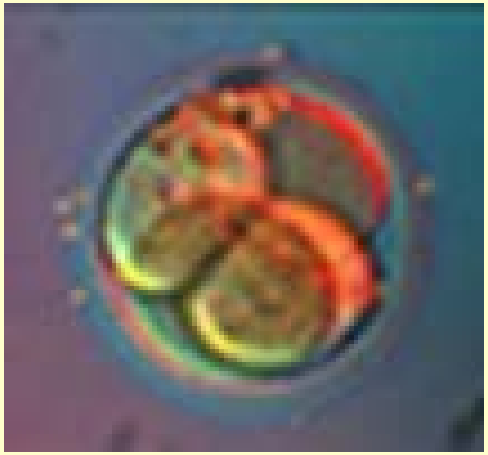


📖 **Recall**: Name the **phase** of the **cell** cycle responsible for DNA replication.

Interphase

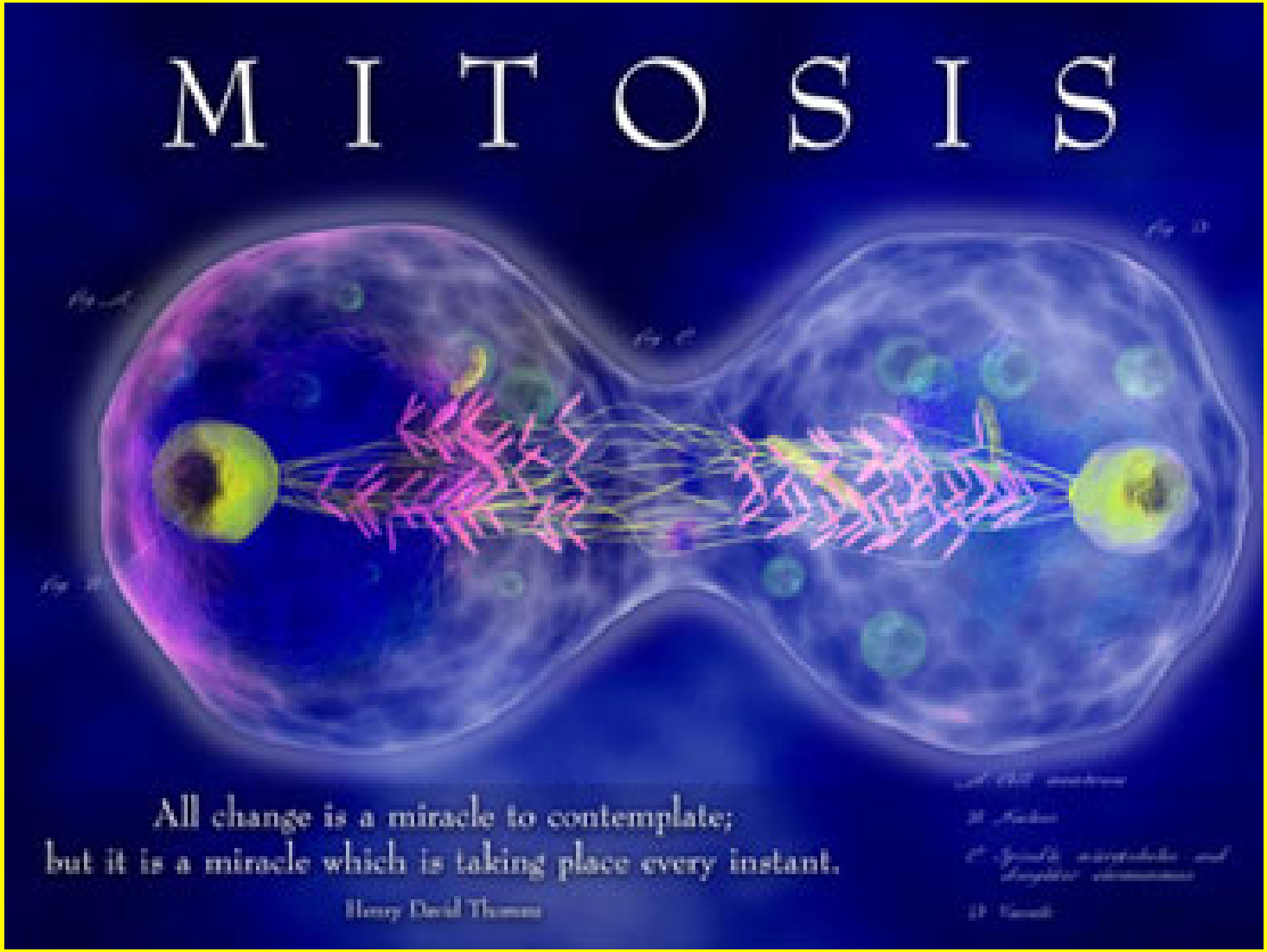
of the Growth Cell Cycle

📖 How would cells be affected if DNA replication **did not** occur before going through cell division?



- Some cells would get extra chromosomes.
- Other cells would get none and eventually die.

📖 Name the **cell division** responsible for producing **<u>identical</u>** cells.



🗣 How DNA Replicates?

1.) **Enzymes** breaks the **weak hydrogen bond** between nitrogen bases of the **2** DNA strands.

2.) This causes the **2** DNA strands to **unzip**.

3.) **Free floating nitrogen bases** in the cytoplasm attach to **each** side of the DNA strand by **weak hydrogen bond**.

🗣 How DNA Replicates Contiunes…

4.) **<u>Another</u> enzyme** helps the free floating nitrogen bases attach to each side of the DNA strand.

5.) **Continues** until **<u>entire</u>** DNA molecule is **unzipped** and **replicated** (***copied***).

6.) End up with **<u>2</u>** sides copied and **<u>retwist</u>**.