Genetics /Fourth Stage

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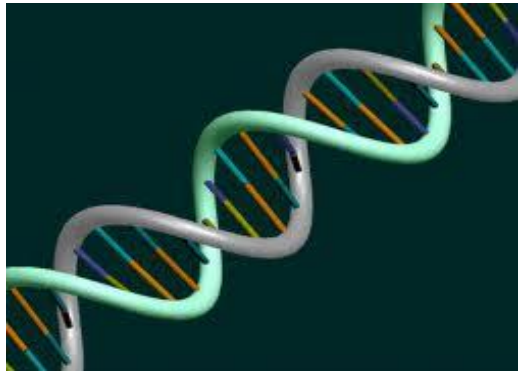
- DNA Extraction….

Is DNA in my Food???

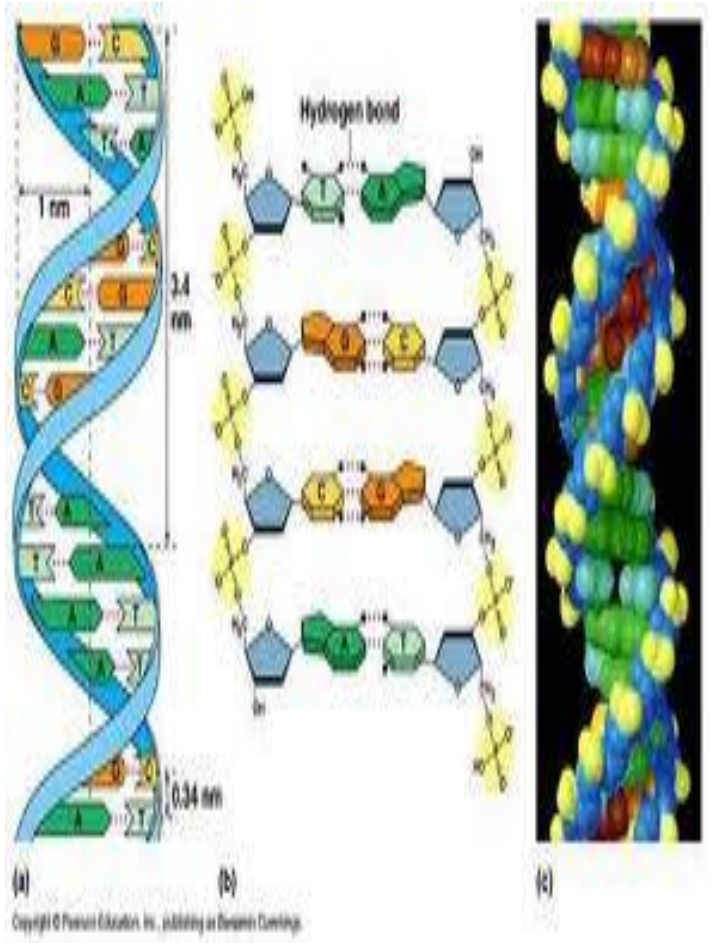
- DNA is present in the **cells of all living organisms.**
- The process of **extracting DNA** from a cell is the first step for many **laboratory procedures in biotechnology**.

Deoxyribonucleic acid (DNA)

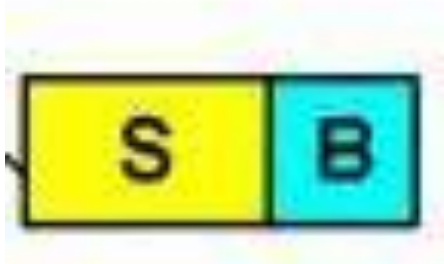


- DNA is a nucleic acid that contains the genetic instructions used in the development and functioning of all known living organisms and some viruses.
- DNA is a set of blueprints needed to construct other components of cells, such as proteins and RNA molecules.

- Two long strands makes the shape of a double helix.
- two strands run in opposite directions to each other and are therefore anti-parallel.
- Chemically, DNA consists of two long polymers of simple units called nucleotides, with backbones made of base, sugars and phosphate groups.

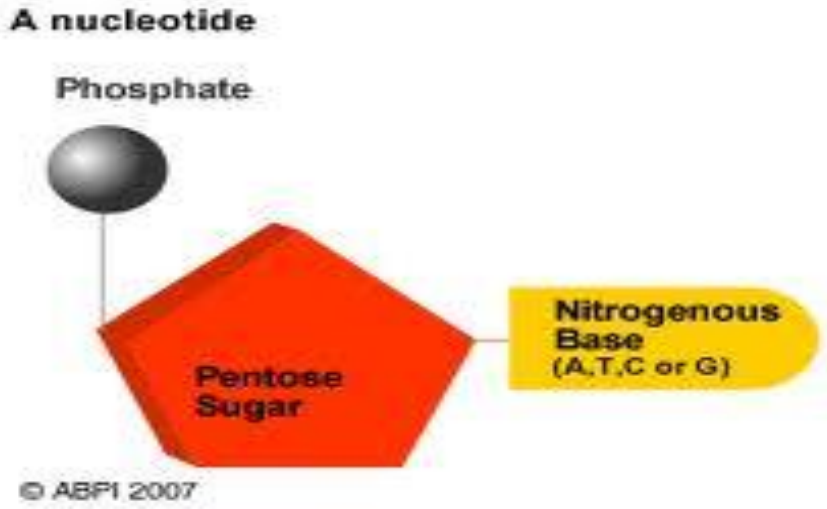


Sugar +Base = nucleoside



nucleoside

Phosphate+ sugar + Base = nucleotide



Bases

- Types:- **adenine** and **guanine** -**Purines**

- **cytosine** & **thymine** -**Pyrimidines.**
- A fifth pyrimidine base, called uracil (U), usually takes the place of thymine in RNA and differs from thymine by lacking a methyl group on its ring.
- PAIRING : A =T and A=U

  G≡C

DNA

- DNA is found in the **nucleus** of all cells
- Most cells have the **diploid 2n** chromosome number
- Many plants are **polyploid** (contain several sets of chromosomes)
- **Strawberries** are **octaploid 8n**

DNA

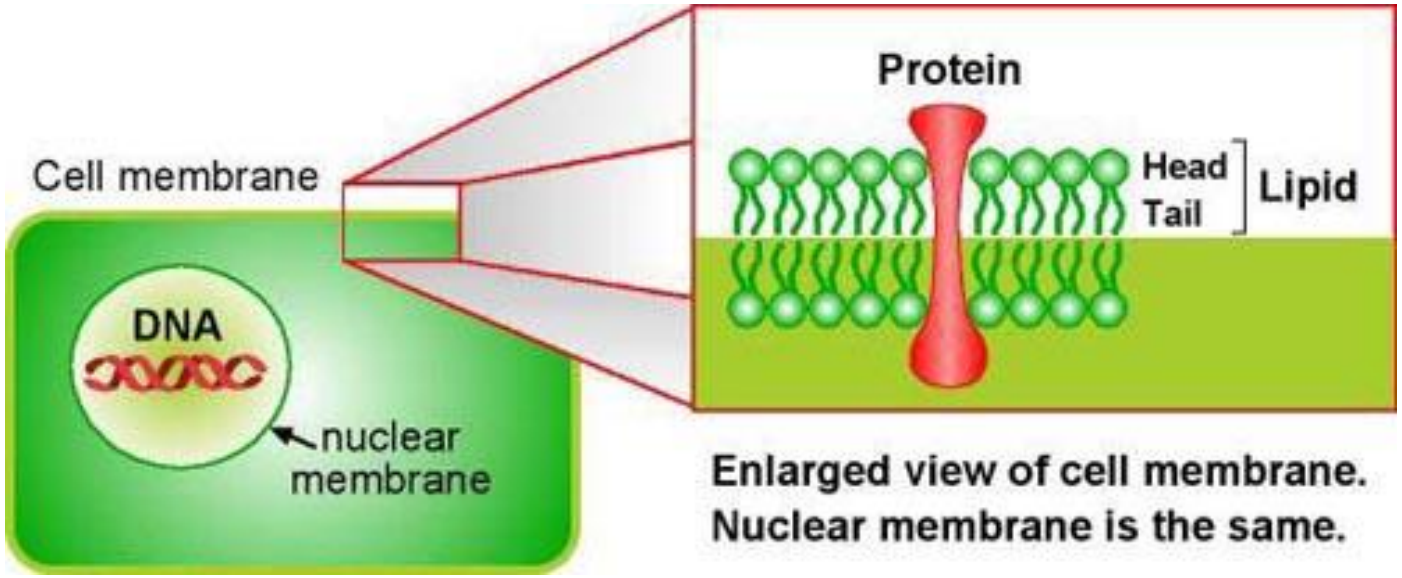
- DNA is enclosed in a nuclear and a cell membrane made of phospholipids
- DNA is also coiled around proteins
- Both the phospholipid layer and the proteins must be removed to see DNA

To Extract DNA, You Must Remove

- Cell membrane
- Cytoplasm
- Nuclear membrane
- Proteins

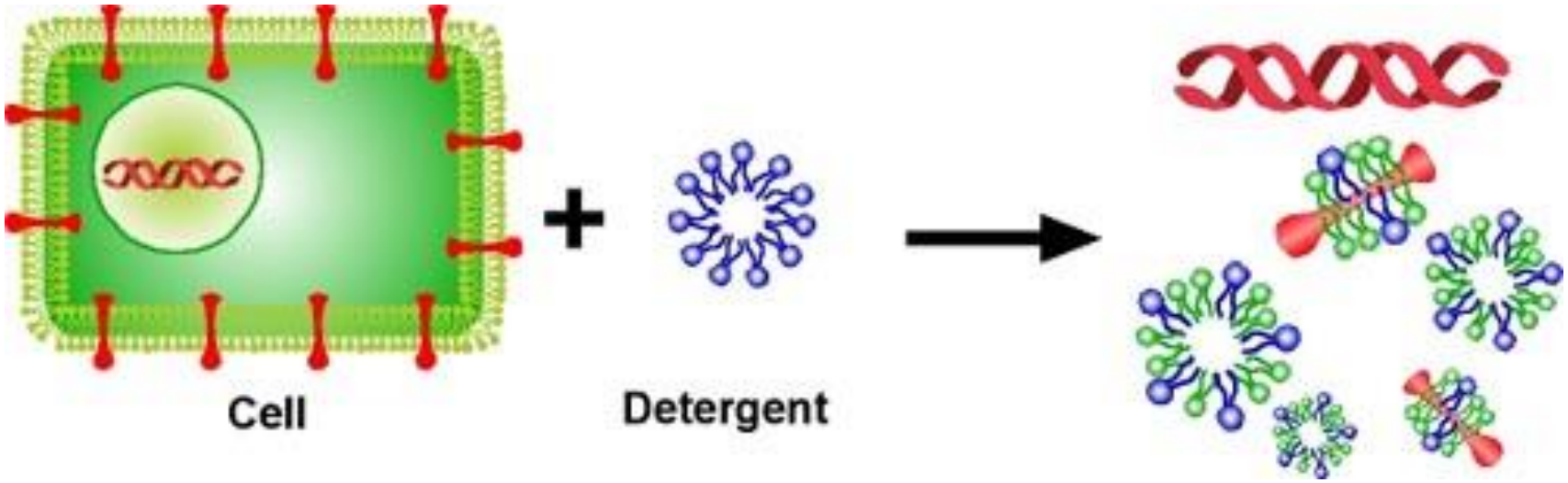
Why add detergent?

- A cell's membranes have two layers of lipid (fat) molecules with proteins going through them.



Why add detergent?

- When detergent comes close to the cell, it captures the lipids and proteins.



Soap & Detergent

- By adding a small amount of **table salt (NaCl)** to the soap solution, the solution can **punch holes** in the nuclear and cell membranes
- The **soapy solution** also helps **removes proteins**

Extracting the DNA

- The **contents of the cell** (organelles, proteins, etc.) must be separated from the DNA
- The **larger cell parts** can be removed by filtering the solid from the liquid

Extracting DNA

- To see DNA, it must be **extracted or "spooled"** from the remaining liquid you filtered
- DNA dissolves in water, but **NOT in alcohol**
- Adding **COLD ALCOHOL** will cause DNA to **precipitate (separate out)** from the liquid filtrate

Collecting the DNA

- The **DNA** will appear as a **white precipitate** once the alcohol is added
- HOLD THE TUBE by the **TOP**, not the bottom so the DNA strands won't **fragment from the heat of your hands!**

Spooling the DNA

- DNA is **sticky** and will adhere to other surfaces
- A **glass stirring rod** can be used to spool (remove) the DNA by using a **turning motion**

• DNA Extraction from Onions

- **A. DNA extraction liquid**:
- 1. 50 ml of distilled water
- 2. 2 drop of dish soup (detergent)
- 3. 1 tablespoon of salt
- **B. Procedure**
- 1) Mash Onions by morter and pistil 5 minute or blender.
- 2) Take 50 ml of salt solution and pour to Onions then add 2 drop of detergent .
- 3) Mash around 1 minute.
- 4) Filtrate by gauze or a piece of cloth and squeeze until all juice goes to beaker.
- 5) Transfer Onions liquid to a test tube. Tilt your test tube and slowly pour rubbing 70% cold ethanol. Pour until you have about the same amount of alcohol in the tube.
- 6) Because alcohol less dens than water, 2 layer will form. Above alcohol layer (supernatant) contains DNA and below (pellet) watery contains residue.
- 7) To see DNA, scroll a thin pipette or wooden stick through supernatant DNA will collect around it as tiny thread.

- Any questions?
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