

Tishk International University
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DNA Extraction from Plant Cells

Human Biology Lab / 6th Lab
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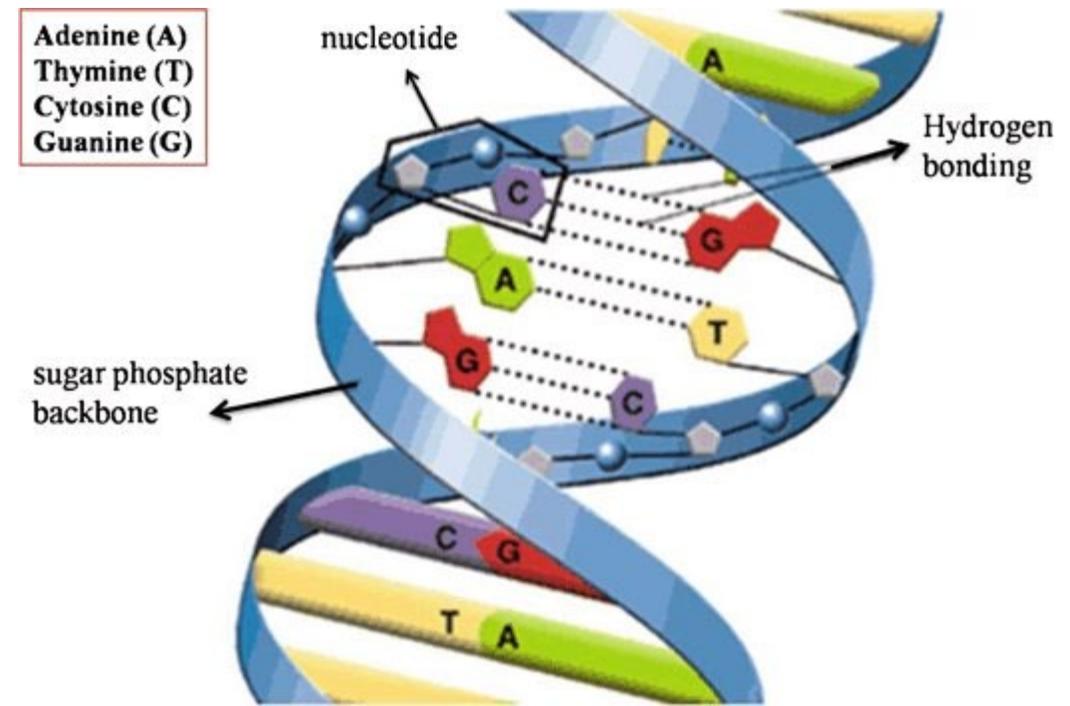
Introduction

Deoxyribonucleic acid (DNA) is the hereditary material found in all living organisms. It carries genetic information that controls cell structure, function, growth, and reproduction.

Although DNA is microscopic, it can be extracted and visualized using simple laboratory techniques that break open cells and separate DNA from other cellular components.

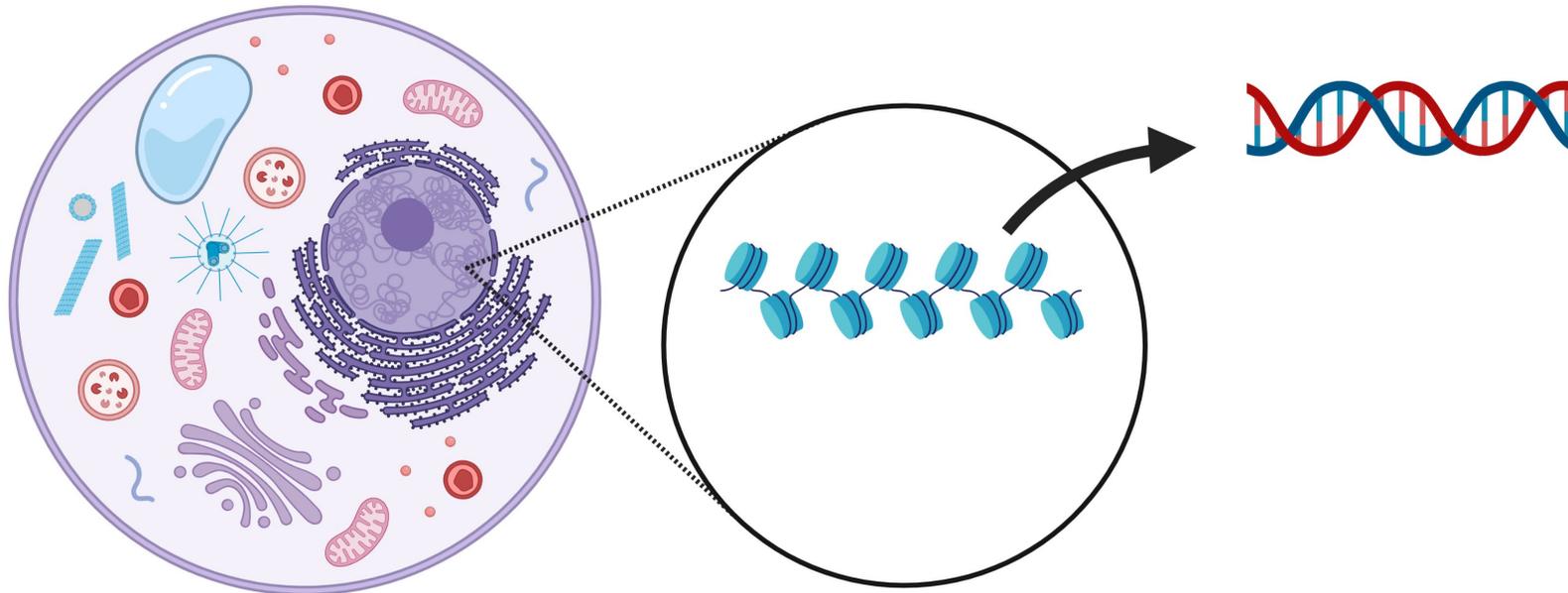
Structure of DNA

DNA has a **double-helix structure** made of two antiparallel strands. The strands are held together by hydrogen bonds between complementary base pairs: adenine pairs with thymine, and guanine pairs with cytosine. The sugar-phosphate backbone provides structural stability, while the base sequence carries genetic information.



DNA in the Cell

In cells, DNA is tightly packed with proteins to form **chromatin**, which condenses into chromosomes during cell division. DNA is normally protected inside the nucleus and surrounded by cell membranes, making it invisible unless these barriers are removed.



Principle of DNA Extraction

DNA extraction is based on:

- **Cell lysis:** breaking cell and nuclear membranes
- **Removal of proteins and lipids**
- **Precipitation of DNA** using alcohol

Because DNA is **insoluble in alcohol**, it precipitates and becomes visible as white, thread-like strands.



Role of Reagents Used in the Experiment

- **Detergent:** dissolves lipid membranes of the cell and nucleus
- **Salt:** neutralizes negative charges on DNA, allowing strands to aggregate
- **Alcohol (cold):** precipitates DNA out of solution

Prelab Question

- What property of DNA makes it visible when alcohol is added?
Why must alcohol be cold?
- What would happen if detergent was not added?
- Why we use Salt in the process
- Is the extracted DNA pure? Why or why not?
- Why is DNA not soluble in alcohol?



Aim of the Experiment

To extract and visualize genomic DNA from plant cells using simple chemical and physical methods.

Materials

- Banana/strawberry (ripe)
- Distilled water
- Liquid dish detergent
- Table salt (NaCl)
- Ethanol or isopropyl alcohol (cold)
- Beaker or cup
- Test tube
- Strainer or gauze
- Glass rod or wooden stick

Procedure

1. Mash a small piece of banana in a beaker with distilled water.
2. Add a few drops of liquid detergent and mix gently.
3. Add a pinch of salt and stir slowly for 1–2 minutes.
4. Filter the mixture into a test tube or beaker using a strainer or gauze.
5. Slowly pour cold alcohol down the side of the test tube or beaker to form a separate layer.
6. Observe the formation of white, thread-like material at the interface.
7. Gently spool the DNA using a glass rod or stick.

Observations

- Appearance of white, cloudy, string-like precipitate
- DNA collects at the alcohol–extract interface