Cell Structure: Observation of Animal Cells and Prokaryotic Cells

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Outline

- Introduction
- Importance of Staining
- Comparison of Animal and Prokaryotic Cells
- Principle
- Materials and Reagents
- Procedure
- Expected Results

Objectives

❖By the end of this lecture, students should be able to:

1. Prepare temporary slides of **human cheek cells** and **bacteria.**

2. Use a compound light microscope correctly.

3. Identify basic **cell structures** under the microscope.

4. Distinguish between eukaryotic (animal) and prokaryotic (bacterial) cells

❑ Introduction?

- Cells are the **basic structural** and **functional units** of life.

- All **living organisms** are composed of **one or more** cells.

❖ Types of Cells:

- Cells are classified based on their structure, organization, and function.

1. **Prokaryotic Cells**
2. **Eukaryotic Cells**

❑ Animal Cells (Human Cheek Cells)

- Human cheek cells are **epithelial cells** that line the inside of the mouth.

➢ Important features of Eukaryotic cells

1) Possess a true nucleus
2) Lack a cell wall
3) Flexible shape
4) Contain membrane-bound organelles

❖ Structures typically observed:

1. Plasma (cell) membrane
2. Cytoplasm
3. Nucleus (clearly visible after staining)

❖ **Why cheek cells are used:**

- ✓ Easily obtained
- ✓ Non-invasive sampling
- ✓ Large and flat cells, easy to observe

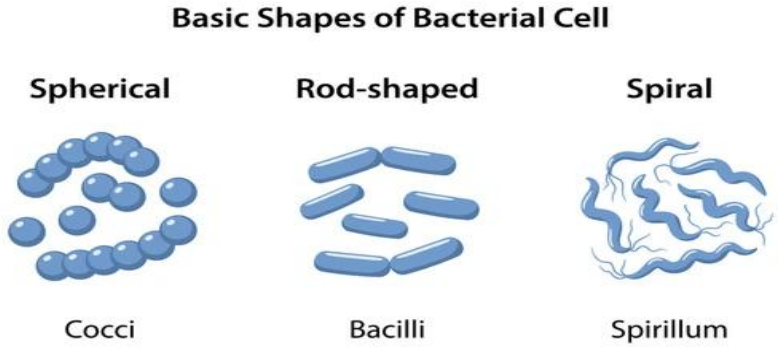
❑ Prokaryotic Cells (Bacteria)

- Bacteria are unicellular prokaryotic organisms.

➢ Important features of Prokaryotic Cells:

1) No true nucleus
2) Genetic material present in a nucleoid region
3) No membrane-bound organelles
4) Smaller than animal cells
5) Possess a cell wall

❖ Structures typically observed:



1. Cell wall
2. Cell membrane (not clearly visible)
3. Cytoplasm
4. Bacterial shape (coccus, bacillus, spirillum)

❖ Why bacteria are studied:

✓ Represent the simplest form of cellular life

✓ Important in medicine, environment, and industry

➢ Importance of Staining:

- Cells are mostly **transparent**; therefore, staining is essential to improve contrast.

- **Methylene blue:** Is commonly used for cheek cells.
  - ✓ Stains the nucleus dark blue

- **Simple stains (e.g., Crystal violet):** Are used for bacteria.
  - ✓ Enhance visibility of cell shape and arrangement

❖ Comparison of Animal and Prokaryotic Cells:

Feature	Animal Cell (Cheek Cell)	Prokaryotic Cell (Bacteria)
Cell type	Eukaryotic	Prokaryotic
Nucleus	Present	Absent
Cell wall	Absent	Present
Size	Larger	Smaller
Shape	Irregular	Definite (rod, sphere, spiral)

1. Observation of Animal Cells (Human Cheek Cells):

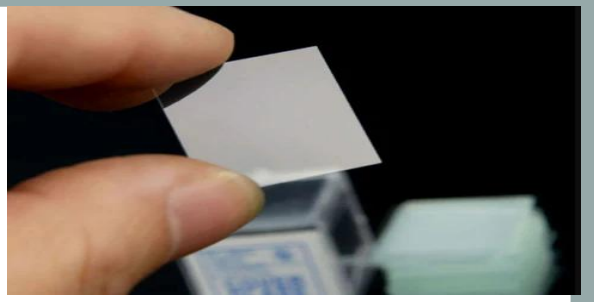
- **Aim**: To observe and identify the basic structure of animal cells using human cheek epithelial cells under a light microscope.

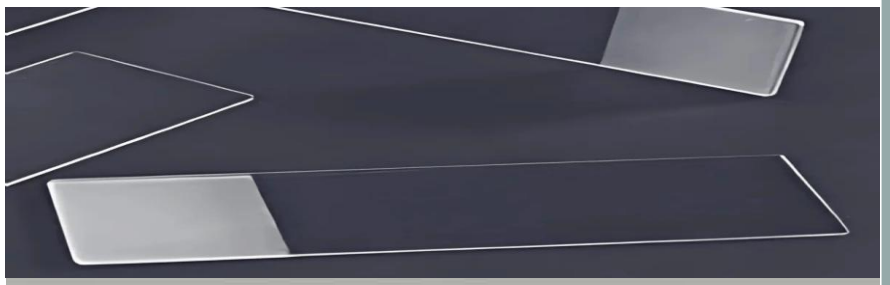
➢ Principle: Human cheek cells are **eukaryotic epithelial cells**. When gently scraped and stained, the stain binds to **nucleic acids**, making the **nucleus clearly visible**.

➢Observation under a compound microscope reveals the **cell membrane**, **cytoplasm**, and **nucleus**, allowing the study of animal cell structure.

❖ Materials Required:

- Clean glass slides
- Cover slips
- Sterile cotton swab
- Methylene blue stain
- Dropper
- Distilled water
- Compound light microscope
- Tissue paper





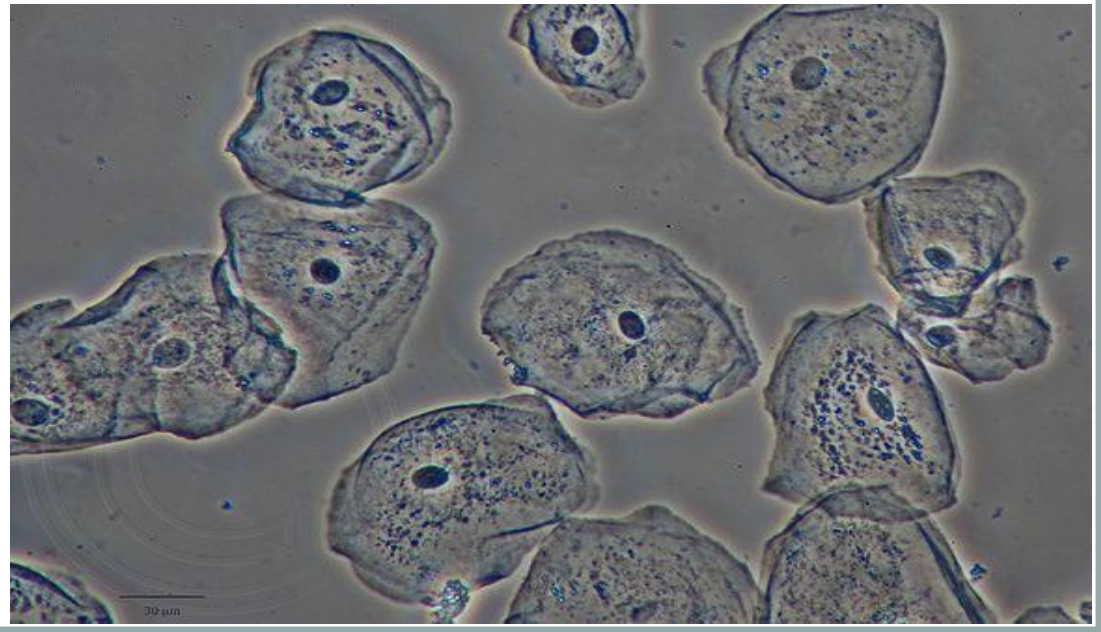
Procedure:

1. Rinse the mouth with clean water.
2. Gently scrape the inner lining of the cheek using a sterile cotton swab.
3. Smear the collected material on a clean glass slide.
4. Add one drop of methylene blue stain.
5. Allow the stain to act for 1–2 minutes.
6. Place a cover slip gently to avoid air bubbles.
7. Remove excess stain using tissue paper.
8. Observe the slide under the microscope, **starting with low** power and **then high power**.

Expected Result:

- Large, flat, irregularly shaped cells are observed
- A distinct nucleus stained dark blue is visible.
- The cell membrane and cytoplasm can be identified.
- No cell wall is present.

Human Cheek Cells



2. Observation of Prokaryotic Cells (Bacteria):

- Aim: To observe and study the structure of prokaryotic cells (bacteria) under a light microscope.

- **Principle:** Bacterial cells are prokaryotic, lacking a **true nucleus** and **membrane-bound organelles**.

- When stained using a simple stain, bacterial cells become visible under a microscope, allowing observation of their shape and arrangement.

❖ Materials Required:

- Prepared bacterial smear (or bacterial culture)
- Clean glass slides
- Cover slips
- Staining reagent (crystal violet)
- Dropper
- Distilled water
- Compound light microscope
- Tissue paper

Procedure:

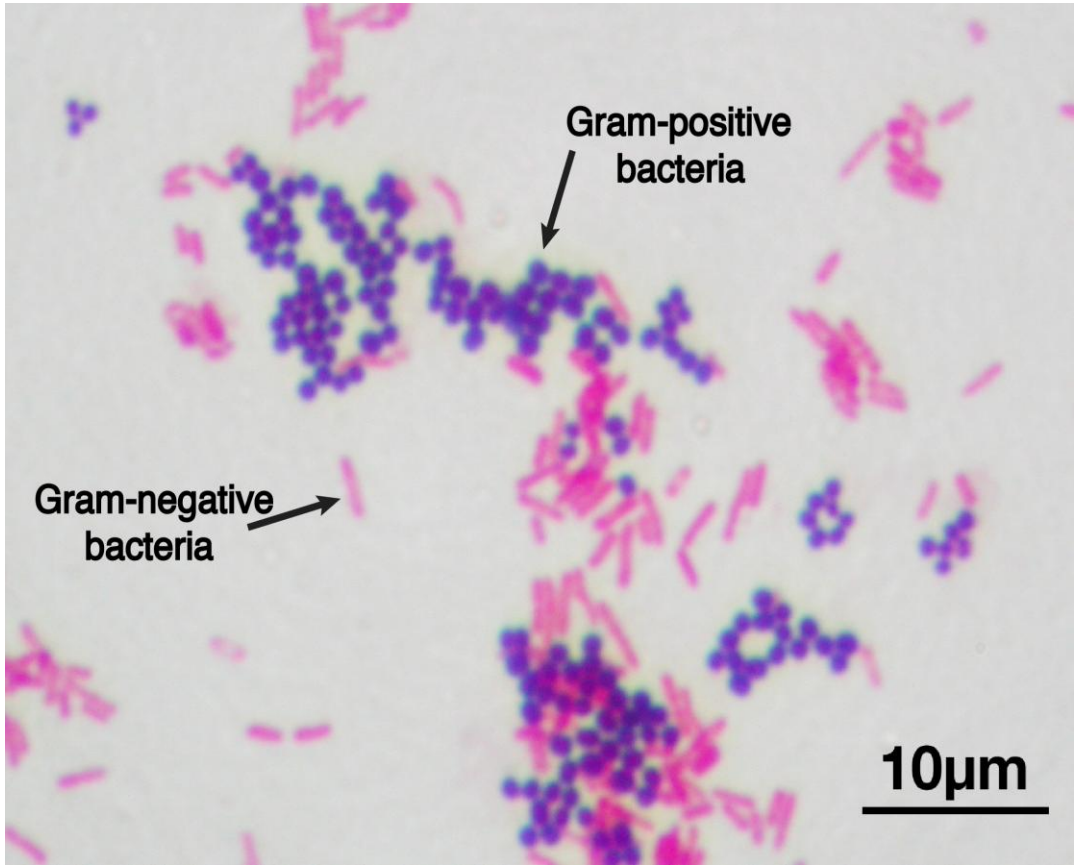
1. Place a drop of bacterial suspension on a clean slide.
2. Spread the drop evenly to form a thin smear.
3. Allow the smear to air dry.
4. Heat-fix the smear gently by passing it over a flame.
5. Add one drop of stain and allow it to stand for 1 minute.
6. Rinse gently with distilled water.
7. Blot dry with tissue paper.
8. Observe under the microscope using low power, then high power.

➢ Expected Result:

- Small bacterial cells are observed
- Cells lack a visible nucleus.

➢ Different shapes may be seen:

- Cocci (spherical)
- Bacilli (rod-shaped)
- Spirilla (spiral-shaped)



- Cells may appear singly, in chains, or in clusters.

References

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Thanks