

A Collection of Curricula for the STARLAB Biological Cell Cylinder

Including:

Examining the Super Cell

The Cell Game by Gary D. Kratzer

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Examining the Super Cell

A Concise Guide to Its Use

The diagrams that follow are meant to aid users of the STARLAB Biological Cell Cylinder in understanding the layout of the cylinder. The three main sections of the Biological Cell Cylinder are:

1. The Nucleus: top of the cylinder
2. Cell Division: lower half of the main body of the cylinder
3. Protein Synthesis Process: upper half of the main body of the cylinder

Note

Following are simple diagrams and explanations of the above cell components and their processes.

Description of the Biological Cell Cylinder

Nucleus (at the top of the cylinder)

Nucleolus

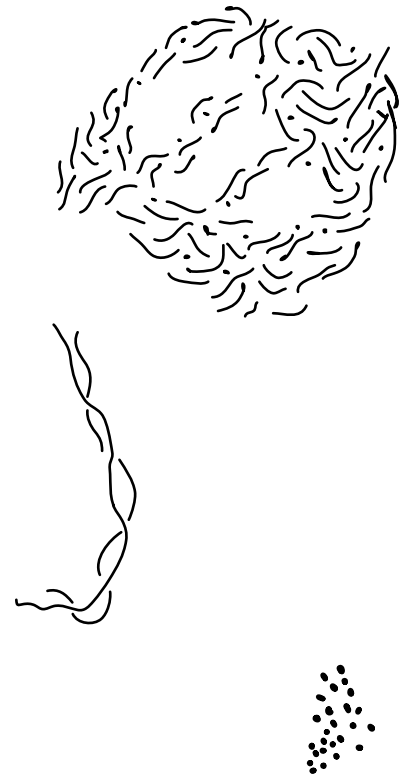
A mass of fine threads and particles, largely a sequence of identical units of specialized genetic material.

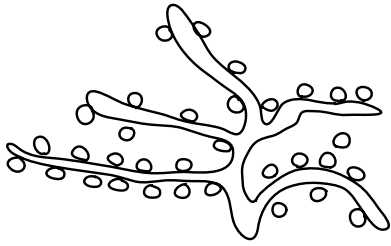
Chromosomes

Individual units of genetic material containing information that is passed from parent cell to daughter cell during multiplication of cells.

Chromatin

Masses of unorganized chromosomes which separate during the cell division process.





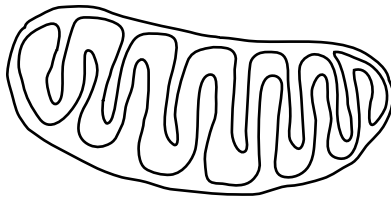
Cell (along the wall of the cylinder)

Endoplasmic Reticulum

Network of tubules often connected to the outer membrane of the nucleus on which ribosomes lay.

Ribosomes

Small particles attached to the endoplasmic reticulum which help to circulate protein throughout the cell for functional and structural processes.



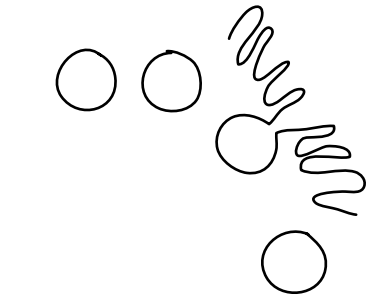
Mitochondria

Inside view of the mitochondrial cristae, on the cristae are enzymes used in the production of energy for cell growth, repair, reproduction and maintenance.



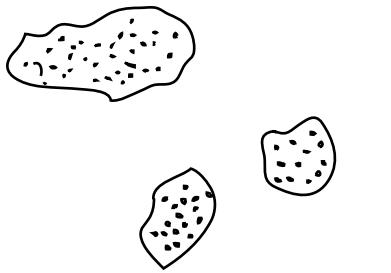
Golgi Complex

Groups of flat sacks which package waste materials for removal from the cell.



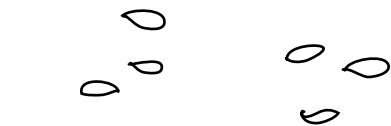
Secretion Vesicles

Groups of sacks that fuse with the cell membrane which allows for waste to be released and carried out of the cell.



Lysosomes

These bodies break down larger molecules into smaller particles that can be used by the cell.



Pinocytotic Vesicles

Particles which allow the cell to take in fluid by surrounding the liquid with a membrane.

Microvilli

Fingerlike projections that increase the surface area of the cell for absorption.



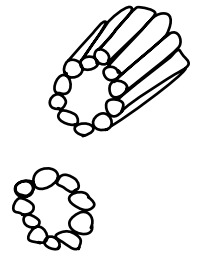
Cilium

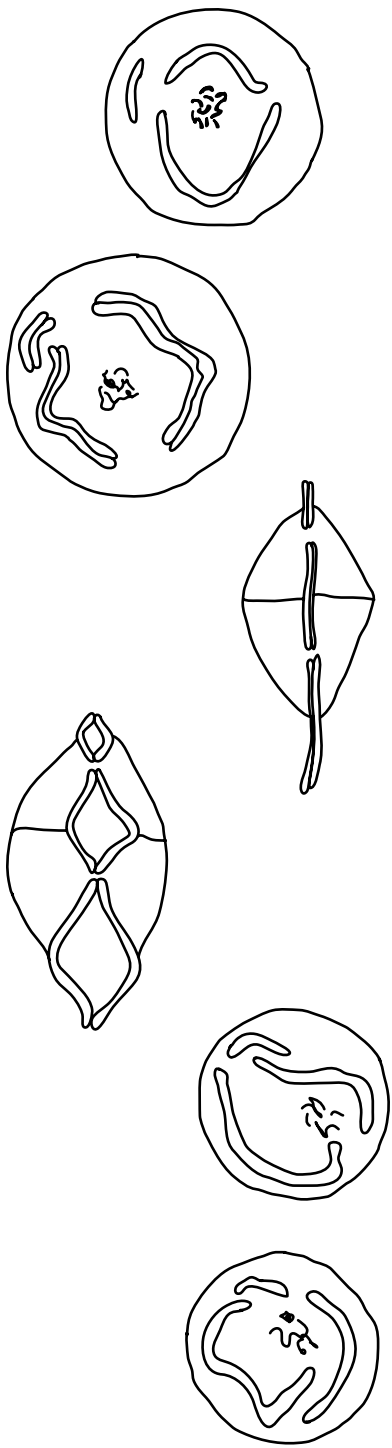
Hairlike projections that are used for movement within the cell.



Centrioles

Particles that help chromosomes migrate — important in the process of cell division.





Mitosis / Cell Division

Interphase

Each chromosome duplicates itself during interphase before the visible mitotic process begins.

Prophase

During prophase, chromosomes begin as long slender threads and later become short compact rods.

Metaphase

The chromosomes begin to line up across the equatorial plane.

Anaphase

Each chromosome separates forming daughter chromosomes, which migrate to opposite sides of the cell.

Telophase

The daughter chromosomes at each side of the cell resolve themselves into reticulum and two nuclei are formed.

The Cell Game

Note

In this planetarium activity, text that is in italics is suggested script for the teacher to use.

Purpose

To review and reinforce the functions of cell parts.

Process Skills

Observing • identifying • cooperation • communication

Objectives

To work cooperatively to identify parts of the cell and review the functions of cell parts.

Preparation

Students should have already studied the parts of the cell. Using the Biological Cell Cylinder, set the projector so that the cylinder is in the vertical position (90° on the latitude scale). Have clues written or glued onto index cards (see p.3) about a particular cell part. Create groups consisting of 4 to 5 students before entering the planetarium. Use a stopwatch or timer to accurately time each group.

Procedure

Have the students line up outside of the dome in prearranged groups of 4 or 5 students. Once the students are inside and are in their assigned groups say:

Our study of the cell in the classroom has provided us with a wealth of information about the parts of the cell. Today we are going to review some of the concepts we have covered in the form of a game called "The Cell Game." Each group must pick a team captain at this time (allow time for the selection). The rules of the game are as follows:

- A team will have 30 seconds to identify a part of the cell from a clue provided.
- Only the team captain may answer. Caution members of your group not to say the answer out loud. The captain must correctly name and point to the part of the cell.
- If a team correctly identifies the part of the cell on the first try, they receive 25 pts., on the second try 20 pts., third try 15 pts., fourth try 10 pts and so on until time is called.
- If a team cannot identify a part of the cell within 30 seconds, the card is passed on to the next team.

After reviewing the rules of the game, select a group to start the competition. One way is to assign each group a number. Write the number on a piece of paper, place them in cup and select a number.

- Each group should be handed an arrow pointer so that they can correctly identify the part of the cell.
- Use game show music, if available, while the teams are trying to identify a part of the cell.

MATERIALS

- STARLAB Portable Planetarium
- Biological Cell Cylinder
- timing device or stopwatch
- 5" x 8" index cards with "cell clues"
- arrow pointer
- game show music

Extensions

- Use the mitosis diagram as bonus questions in the cell game.
- Evaluate the students' knowledge of cell division by giving a quiz on the 5 part stages of mitosis.

Clues

Note

These clues can be cut out and glued to index cards.

1. Masses of unorganized chromosomes which separate during cell division.
2. A mass of fine threads and particles of specialized genetic material.
3. Groups of flat sacks which package waste material for removal.
4. Help circulate protein throughout the cell.
5. A network of tube-like canals connected to the outer membrane of the nucleus.
6. Hairlike projections responsible for movement within the cell.
7. Genetic material with information passed from parent cell to daughter cell during multiplication of cells.
8. Responsible for the production of energy for cell growth, repair, reproduction and maintenance.
9. Groups of sacks that fuse with the cell membrane which allows for waste to be released and carried out of the cell.
10. Break down larger molecules into smaller particles that can be used by the cell.
11. Hairlike projections that are used for movement within the cell.
12. Particles which allow the cell to take in fluid the liquid with a membrane.
13. Particles that help chromosomes migrate.

Answer Key to Clues

1. Chromatin
2. Nucleolus
3. Golgi Complex
4. Ribosomes
5. Endoplasmic Reticulum
6. Cilium
7. Chromosomes
8. Mitochondria
9. Secretion Vesicles
10. Lysosomes
11. Microvilli
12. Pinocytic Vesicles
13. Centrioles