

Chapter 4 Project

Solving a Cell Mystery

Project Goal + Timeline

In this project, we will review your knowledge of the organelles and structures that make up cells by building a model of a eukaryotic or bacteria cell. The project will conclude with a *Guess-That-Cell* game, involving the entire class, guessing the identity of each constructed model. The cell model should be constructed individually. The *Guess-That-Cell* game involves the entire class. The entire project should be completed in 2 sessions. Aim for 90 minutes for model building time and 30 minutes for the *Guess-That-Cell* game.

Directions

Part 1: Test Your Knowledge

TABLE 1: Pick a cell component that, if malfunctioning, could explain each described problem.

Description of Cell Problem	Malfunctioning Organelle/Cell Structure
Protein synthesis is impaired. Evidence suggests the DNA itself is intact. It also appears that mRNA is synthesized correctly and leaves the nucleus.	
Cultured animal cells fail to complete mitosis. DNA condenses properly. The cells fail to carry out cytokinesis and fail to adapt their shape correctly.	
Cell growth and activity is impaired due to low levels of cellular energy.	
Plant cells are fragile and rupture easily when exposed to osmotic pressure.	

Part 2: Select and Create Your Cell Model

Roll a six-sided die. From the following list, circle the cell for the number you rolled: (1 or 2) animal cell, (3 or 4) plant cell, (5 or 6) prokaryotic cell. Then, research this cell type. Answer the following planning questions pertaining to your cell type.

1. Briefly describe this cell's appearance. Is your cell a eukaryotic or prokaryotic cell?
2. Compare your cell type to the other two cell type options. Look for differences. How does the shape compare? Do any structures/organelles show up in one but not the other? Identify three structural differences and write them down.
3. Before constructing your model, do some planning. Sketch your cell in the following table. Which organelles/structures must your model be able to represent? List craft supplies to represent each structure to include. This is an opportunity to get creative and use any materials available to you.

TABLE 2: Plan for how to build your model.

Sketch your cell in the following space.	List organelles to include in model.	List craft items to represent organelles.

Now build your cell model! This can be done either in class or as a take-home project. If completed at home, use craft supplies found at home. Here are some guidelines to follow:

- The model should be about the size of a fist.
- The model should show the cell's 3-D shape.
- A cutaway portion should show the internal organelles/structures.
- All structures/organelles should be labeled. (Toothpick and masking tape flags work well.)
- Do not stick a cell type label to your model.

Finally, write the cell type on an index card. This card will accompany your model. Then, flip the card over.

Part 3: Play *Guess-That-Cell*

As a class, set up display tables for all cell models. Number each card to allow for easy identification.

Game Rules: The class explores the displays quietly for 5-10 minutes. Individually, guess each model's cell type as either plant, animal, or bacteria. Write your guesses down. After guessing, discuss your results as a class and uncover the correct answers.

To submit your project, turn in Table 1, Part 2 Questions, and your model.

Project Materials

- 1 die, 6-sided (or random number generator)
- Glue
- Tape
- Pencil
- Markers
- Miscellaneous craft supplies (e.g., paper, paper clips, toothpicks, pipe cleaners, straws, Play-Doh, etc.)

Student Checklist

- ☐ Complete Table 1
- ☐ Complete Questions 1–3
- ☐ Build and label a cell model and complete index card
- ☐ Complete the cell identification game