

Activity The Incredible Edible Cell

Subject Area(s) Biology

Associated Unit Curricular Unit: Cells

Associated Lesson Lesson: Cell Celebration!

Activity Title The Incredible Edible Cell

Header



Image 1

ADA Description: Edible plant cell created by an AP biology student

Caption: An Edible plant cell created by an AP Biology student

Image file: edible cell 1.jpg

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Grade Level 11 (10-12)

Activity Dependency

Time Required 10 minutes to introduce and a 40 minute class a week later

Group Size Individual

Expendable Cost per Group US\$ ____

Summary

The students are given an assignment to design a cell that is edible and no bigger than 1 inch square. They must include 15 organelles and use materials that represent form and function. Each student will present their cell and write an essay explaining their material choices. After the presentation is over, each student is required to eat their own cell.

Engineering Connection

When designing systems, engineers are constantly struggling with material limitations, size limitations, and other rules. Designing a cell, animal or plant, with specific qualifications can be very difficult. Biomimicry is a common theme among engineers thus the students must mimic nature with their material choices.

Engineering Category = # 1, 2, & 3

Choose the category that best describes this activity's amount/depth of engineering content:

1. Relating science and/or math concept(s) to engineering
2. Engineering analysis or partial design
3. Engineering design process

Keywords

biomimicry, cell, edible, organelles

Educational Standards

Choose from <http://www.jesandco.org/asn/viewer/default.aspx>.

ITEEA

Standard 20. Students will develop an understanding of and be able to select and use construction technologies.

Structures are constructed using a variety of processes and procedures.

State/national science/math/technology (provide source, year, number[s] and text):

TEKS BIO 4A: The student knows that cells are the basic structures of all living things with specialized parts that perform specific functions and that viruses are different from cells. The student is expected to compare and contrast prokaryotic and eukaryotic cells.

Pre-Requisite Knowledge

Learning Objectives

After this activity, students should be able to:

- Describe the form and function of at least 15 different organelles in cells
- Design a biomimetics system that is entirely edible

Materials List

Each group needs:

- A handout with the directions for the assignment
- Each student will provide their own materials

To share with the entire class:

- None

Introduction / Motivation

The cell is a spectacularly designed system. Both animal and plant are designed with a specific function. Within the cell, organelles have specific functions that are reflected in their form. The main idea in nature's design is that form follows function. Engineers try to mimic nature when designing systems. A system could be anything from a bridge to a computer chip. Biomimetics is the process of mimicking nature. Your assignment is to design a cell that is edible. You will have to choose materials that represent 15 different organelles. You can choose either animal or plant cell however it can be no bigger than 1 inch by 1 inch by 1 inch. So be choosy when picking your materials. You will have to eat it after the assignment is over to earn full credit. In other words, bacon is long, skinny, and folds similar to the smooth endoplasmic reticulum. And bacon coated in sugar crystals is similar to the rough endoplasmic reticulum. Form follows function!

Vocabulary / Definitions

Word	Definition
Biomimetics	Imitating nature through design
Organelle	Specialized subunit within a cell with a specific function

Procedure

Background

A lesson on cells and organelle function should be taught prior to this activity. Any biology text book will have this information available.

Wikipedia.com provides a page on Biomimicry that will explain everything about the subject.

Before the Activity

- Print out a copy of the handout for each student.
- Provide the students with 1 week to finish the assignment.
- Plan lessons around the presentation of the edible cells.

With the Students

1. Pass out the handout to each student.
2. Clearly announce the 1 week due date.
3. Describe the assignment: Materials must be edible. 15 organelles must be represented. Size requirements. Materials must represent form and function. An essay must be written describing the reasons the student chose the edible material for each organelle. A presentation to the class will be given by each student about their cell. The cell must be eaten for full credit.
4. After 1 week, have the students present their cells to the other students. They should explain at least 5 organelle material choices.
5. After all presentations are done, every student should eat their cell.
6. Turn in the essay relating material choices and organelle function.

Image Insert Image 2, [note position: centered]



Image 2

ADA Description: An edible animal cell made by an AP Biology student

Caption: An edible animal cell created by an AP Biology student

Image file: edible cell 3.jpg

Source/Rights: Elizabeth Raska



Image 3

ADA Description: A collection of edible cells made by AP Biology students

Caption: A collection of edible cells created by AP Biology students

Image file: edible cell 2.jpg

Source/Rights: Elizabeth Raska

Attachments

Edible Cell (doc)

Edible Cell (pdf)

Safety Issues

- All materials used to create the cell must be edible.
- Be aware of any food allergies.

Troubleshooting Tips

The students may want a glass of water when eating their cell. The combined materials can lead to a unfavorable taste.

Investigating Questions

Assessment

Pre-Activity Assessment

A quiz over cells and organelle function will assess the students' understanding of this lesson.

Activity Embedded Assessment

Allow the students to ask any questions about the assignment. Make certain that the students understand the assignment and handout.

Post-Activity Assessment

Grade the cells based on their completion and creativity. The materials chosen should be representative of the organelle's function.

Activity Extensions

During the week, ask the students what type of materials they are thinking about using for their cells. Encourage creativity and uniqueness.

Activity Scaling

- For lower grades, lower the amount of organelles required and/or increase the size requirements.
- For more advanced students, grade based on clarity of the cell. Is each organelle identifiable without the need for the essay.

Additional Multimedia Support

References

Other

Redirect URL

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Supporting Program

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Version: September 2010