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What Do Cells Have to Do with Me?

Follow Up from BioBus Mobile Lab Visit

If you do not have access to laptops please contact BioBus staff for alternative lessons plans

Duration

Three days

Resources

Laptops

Poster paper

Markers

Interactive whiteboard or Projector

Purpose: To build on the BioBus learning experience; to deepen students' scientific knowledge and understanding of cells; to use that understanding to create a logical argument. Students will conduct research on scientific topics in order to enhance their understanding of cells, of the ways that humans are able to manipulate cells in a laboratory environment, and of how these manipulations relate to the students' everyday lives.

Objectives

- Students will learn how to ask questions, gather evidence in a scientific manner, and how to present a logical argument;
- Students will have an enhanced understanding of different cell types and their function in various organisms.

Outline

Day 1: The teacher will create small groups of 3-4 students and discuss the BioBus experience, review concepts related to cells and, if necessary, repeat relevant vocabulary.

Days 2&3: Students will apply what they have learned in the classroom and on the bus to create a presentation on topics within cell biology. A [rubric](#) and [recommended list of topics](#) are provided.

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What Do Cells Have to Do with Me?

Grades 9-12

Before Day 1, students should know:

- the cell is the basic unit of life;
- organisms can be single-celled or multicellular;
- the concept of length scale (meter vs. millimeter).

Day 1

Project introduction

Location: Classroom

Duration: 1 class period (40 minutes)

Resources: Laptops (minimum 1 per group); interactive whiteboard or video projector preferred

Purpose: Review of concepts in cell biology

1. Divide students into small groups
2. Pass out student handouts and laptops
[Student handout](#)
3. Introduce the 4-day activity

The BioBus scientists have created a special program for students to follow up on the work they did on board the BioBus mobile science lab. Through this program, students will use scientific research to learn and present a chosen topic within the field of Cell Biology. Over the course of three days, students will review their understanding of cells and see the connections between Cell Biology and their everyday lives. On the first day, students will decide on their topic of interest and research it through online resources. During the last two days, students will generate a presentation based on the research that was conducted and present a logical argument on their topic to the whole class. This argument will be graded according to a rubric designed by the BioBus scientists.

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5. Review the vocabulary terms below with your students.

- **Cell:** The smallest unit of life. All living things are made of cells, and multi-celled organisms have different types of cells that perform different functions.
- **Tissue:** A group of similar cells that together carry out a specific function.
- **Millimeter:** A unit of length, a thousand times smaller than a meter.
- **Micrometer:** A unit of length, a thousand times smaller than a millimeter. Most cells are 1-100 micrometers long.
- **Cell Culture:** A process of growing cells under controlled conditions outside of their natural environment. These cells originally come from a multi-celled organism.
- **Cell Division:** A process when one cell splits into two cells. These “daughter” cells are usually of the same or similar type as their “parent” cells.

6. Introduce students to a current events topic related to Cell Biology such as the cell cultured meat concept.

Cell cultured meat is meat (muscle cells) that is grown within a science laboratory instead of within an animal. Scientists can take stem cells from an animal without causing harm and guide those stem cells to develop into muscle cells. These muscle cells are cultured in the lab until enough of the muscle cells have grown to form a consumable meat patty. This is currently an active area of research and development and so far, none of these synthetic foods have reached the marketplace.

7. Show the video: ["Cultured Beef" by SonicPicnic](#)

8. After the video, use a share out strategy such as Think-Pair Share to get the students' immediate thoughts about cell-cultured meat. *Ask: what other questions do you have? Can you think of one reason to eat such meat and one reason not to?*

Additional sample topics include:

- Stem cell research
 - The use of stem cells has the potential to cure human diseases. However, some types of stem cells are acquired from embryos which generates moral implications and debate on research funding from governments.
- Treating cancer using immune cells
 - This field is called Cancer immunotherapy and is based on the fact that our immune system can attack “foreign” cells. This may make it possible for our own body to attack and destroy cancer cells.
- Immortal cells
 - Most of the cells in the human body have a finite life span. In contrast, cancer cells have figured out a way to circumvent mortality and become “immortal”. These type of cells can grow and divide without limit!

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- Microbiome
 - A microbiome is a community of microbes and an active area of research is in learning more about the human microbiome. Microbes can interact within their community and can change over time. Because disrupting the human microbiome could lead to disease, understanding the interaction between the human and the human microbiome can help researchers understand and manage diseases.
- Personal genetic testing
 - Personal genetic testing is a test that provides information about chromosomes, genes, or proteins. The results of these tests can confirm or rule out genetic conditions or determine a person's chance of developing or passing on a genetic disorder. In today's times access to your own personal genetic information is easier and with that accessibility comes conflicting opinion on whether this information should be given directly to the consumer.
- Genetically modified organisms (GMOs)
 - A genetically modified organisms is an organism (such as a plant, animal or microorganism) that has had its DNA modified in some way. GMOs can result in things such as potatoes that don't bruise or apples that don't brown. Some potential risks as a result of genetic modifications could be that these changes harm the organisms or could lead to the extinction of the original organism. While developed nations do not consider GMOs to be safe, many scientific organizations believe that these feelings are based in emotions and not in fact.

9. Student Mission: Utilize the laptops to research appropriate topics

[See recommended topics and sites under teacher resources.](#)

We recommend providing a 10-15 minute time restriction to determine a topic

10. Ask each group to report their chosen topic.

11. Utilize the remainder of the class period for continued scientific research and completion of the student handout.

12. Collect student handouts at the end of the class.

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Day 3

Project Research

Location: Classroom

Duration: 1 class period (40 minutes)

Resources: Laptops (minimum 1 per group); Poster, Markers

Purpose: Begin working on argument template of chosen topic

1. Return to original small groups.
2. Redistribute student worksheets from Day 1.
3. Pass out the [Argument Template](#) (at least one copy per group) and laptops
The argument template is broken into 7 argument elements:
 - a. **“We think that”** - Students state their opinion on the chosen topic.
 - b. **“Here’s what that means”** - Explain the Cell Biology related to their topic
 - c. **“And where we learned about it”** - Add scientific resources used
 - d. **“This matters because”** - Justify of why their chosen topic is important
 - e. **“Some may say that”** - Place a counter-argument to their original opinion
 - f. **“But”** - Reaffirm their original opinion
 - g. **“Therefore”** - Conclusion
4. Explain that students will have two periods to create a presentation about their chosen topic, which will be scored.
5. Presentations can be scored as follows: **1 point per argument element; 1 point to the team if any team member asks a question during other presentations; 1 point if the team can answer a question.**
6. Explain group work objectives:
 - a. Decide as a whole group on a position regarding their chosen topic;
 - b. Within the groups, assign each argument element to a group member to complete.
7. Encourage creativity (suggestions: creating a poster, a video or a skit).

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Day 4

Presentation

Location: Classroom

Duration: 1 class period (40 minutes)

Resources: Laptops, interactive whiteboard or video projector preferred

Purpose: Complete the argument template and student presentations

1. If necessary, allow students to complete their presentations.
2. Allow student groups to present their research topics with enough time to facilitate a question and answer portion at the end of the presentation.
3. Utilize the scoring rubric described in Day 3 to assess each argument.
4. Finally, wrap up with a class discussion about the importance of understanding cells.

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Teacher Resources

Below are some supplemental resources that can provide additional information on suggested Cellular Biology topics.

Microbiome

[The Human Microbiome](#)

Stem Cells

[What can stem cells do? \[video\]](#)

Three parent babies

[Three Parent Babies Explained \[article\]](#)

Immortal Cells

[Henrietta Lack's 'Immortal' Cells \[article\]](#)

Personal Genetic Testing

[My Medical Choice by Angelina Jolie \[article\]](#)