



Paideia Seminar Lesson Plan



Text:

“Lives of a Cell – Introduction” by Lewis Thomas

Grade/Subject

MS / Science



Ideas, Values:

Science (Cells), Stability & Change, Nature, Systems, Relationships, Structure & Function



Pre-Seminar Content



Launch Activity:

- Have students write in response to the prompt, “What is the life of a cell?” and describe what it might be like to be a cell.
- Then watch the video clip “The Inner Life of the Cell” by BioVisions at Harvard University on YouTube at <https://www.youtube.com/watch?v=wJyUtbn0O5Y>
- In groups, have students discuss how their ideas were similar to and different from the scientists’ at Harvard.



Inspectional Read:

As you read the text aloud, have students follow along, and label paragraphs A, B, C, etc. in each section. (Sections 1-4 are already labeled.)

Background Information:

Share as appropriate: Dr. Lewis Thomas has been described as a poet-philosopher of medicine. Growing up in Flushing, Queens in the early 1920's he would accompany his father, the town doctor, on house calls. He was dean of the Yale School of Medicine from 1972-73, chief executive officer of Sloan-Kettering Cancer Center for seven years until in 1980 he became chancellor and eventually president emeritus. The writings that brought him fame were first published as separate essays in *The New England Journal of Medicine* and were published in 1974 as the best-selling book, *Lives of a Cell*. He was once called "evolution's most accomplished prose stylist." He died in 1993 at age 80.

Vocabulary:

Provide definitions, examples, or synonyms for some/all of the following words and have students work in groups to rewrite a section substituting the more common word or definition. Use a Google Doc and have all students edit the document together by creating a table with the word, paragraph #, definition, and synonyms. (An example document is included with this plan.)

Non-science Specific Words: *detach, polymer, writhing, stupendous, transient, vulnerable, undermined, entities, colonial posterity, precursors, consoled, fusion, contingencies, differentiation, speciation, derived, progeny, tedious, matrix*

Science Specific Words: *rhizobial bacteria, basal bodies [modified microtubules or centrioles that give rise to cilia or flagella], aphids, oxidative energy, prokaryocytes, eukaryotic, mitochondria, centrioles, genome, chloroplasts, enzyme*

Analytical Read:

For each section, students should choose the quotation that is most vivid and draw a picture of the "images you see in your head" while reading that quotation. Students should also write a brief summary of the meaning of the entire section. (See graphic organizer attached to plan.)



Pre-Seminar Process

 Define and state purpose for Paideia Seminar.

 Describe the responsibilities of facilitator and participants.

 Have participants set a Personal Goal.

 Agree on a Group Goal.

Seminar Questions

Opening (Identify main ideas from the text.):

- ❖ How does Lewis Thomas best help us ‘see’ into the lives of a cell? Cite specific examples in the text.

Core (Analyze textual details.):

- ❖ How does the author explain man’s relationship to nature?
- ❖ What does the author mean by, “We are shared, rented, occupied”? (section 2, paragraph A)
- ❖ Thomas says, “Mitochondria are stable and responsible lodgers, and I choose to trust them.” What does he mean by ‘trust’? (section 2, paragraph A)
- ❖ What does the author mean when he says, “I cannot feel as separate an entity as I did a few years ago...”? (section 2, paragraph D)
- ❖ Why would the author say that “the uniformity of... life [is] more astonishing than the diversity of life”? (section 3, paragraph A) What evidence from the text supports this idea?
- ❖ Based on Thomas’ description, what is the most important part of a cell? Why?
- ❖ Do you agree with Thomas’ idea that cells are “...ecosystems more complicated than Jamaica Bay?” (section 2, paragraph A). Explain.

Closing (Personalize and apply the ideas.):

- ❖ Taking further Thomas’ idea that the earth “is most like a single cell” (section 4, paragraph A) in terms of functions, what specific parts of a cell can be compared to parts of the earth? Why?

Post-Seminar Process

- ★ Have participants do a written self-assessment of their personal participation goal.
- ★ Do a group assessment of the social and intellectual goals of seminar.
- ★ Note reminders for next seminar.



Post-Seminar Content

★ Transition to Writing:

Return to the writing from the *Launch* activity, and have students read their description of a “life of a cell”. Ask them to note things that they read, heard, said, or thought during seminar that changed their ideas about cells.

★ Writing Task:

What organelle is most important to the survival of a cell? After reading, “Lives of a Cell”, write an argumentative essay in which you discuss the structures and functions of cell parts and evaluate the most important organelle for a cell’s survival. Support your position with at least two pieces of evidence from the text.

(LDC Task#: 6)



Brainstorm:

Ask students to work in groups to find citations in the text to be used as evidence that a cell part is important. This T-chart may be helpful as an organizer.

Cell Part	Citation

Structure the Writing:

Provide the following structure of an argumentative essay to support students' writing.

- Introduction/Argument
- Counter-Argument
- Evidence/Reasoning 1
- Evidence/Reasoning 2
- Conclusion

Have students select the text evidence they will use to support their argument.

First Draft:

Give time for students to write their ideas according to the structural format of the argumentative essay, being certain to include evidence from the text from the *Brainstorm* activity.

Collaborative Revision:

Have participants work in pairs to read their first drafts aloud to each other with emphasis on reader as creator and editor. Listener says back one point heard clearly and asks one question for clarification. Switch roles. Give time for full revisions resulting in a second draft.

Edit:

Once the second draft is done, have students work in small groups to read each other's work silently and carefully. Readers should use the argumentative essay rubric as a guide to give feedback (attached). Give time for revisions.



Students' final copies should be hung in a conspicuous area of the classroom or hallway or posted to the classroom website.

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Lives of a Cell Introduction:

1 We are told that the trouble with Modern Man is that he has been trying to detach himself from nature. He sits in the topmost tiers of polymer, glass, and steel, dangling his pulsing legs, surveying at a distance the writhing life of the planet. In this scenario, Man comes on as a stupendous lethal force, and the earth is pictured as something delicate, like rising bubbles at the surface of a country pond, or flights of fragile birds.

But it is illusion to think that there is anything fragile about the life of the earth; surely this is the toughest membrane imaginable in the universe, opaque to probability, impermeable to death. We are the delicate part, transient and vulnerable as cilia. Nor is it a new thing for man to invent an existence that he imagines to be above the rest of life; this has been his most consistent intellectual exertion down the millennia. As illusion, it has never worked out to his satisfaction in the past, any more than it does today. Man is embedded in nature.

The biologic science of recent years has been making this a more urgent fact of life. The new, hard problem will be to cope with the dawning, intensifying realization of just how interlocked we are. The old, clung-to notions most of us have held about our special lordship are being deeply undermined.

2 — *Item.* A good case can be made for our nonexistence as entities. We are not made up, as we had always supposed, of successively enriched packets of our own parts. We are shared, rented, occupied. At the interior of our cells, driving them, providing the oxidative energy that sends us out for the improvement of each shining day, are the mitochondria, and in a strict sense they are not ours. They turn out to be little separate creatures, the colonial posterity of migrant prokaryocytes, probably primitive bacteria that swam into ancestral precursors of our eukaryotic cells and stayed there. Ever since, they have maintained themselves and their ways, replicating in their own fashion, privately, with their own DNA and RNA quite different from ours. They are as much symbionts as the rhizobial bacteria in the roots of beans. Without them, we would not move a muscle, drum a finger, think a thought. Mitochondria are stable and responsible lodgers, and I choose to trust them. But what of the other little animals, similarly established in my cells, sorting and balancing me, clustering me together? My centrioles, basal bodies, and probably a good many other more obscure tiny beings at work inside my cells, each with its own special genome, are as foreign, and as essential, as aphids in anthills. My cells are no longer the pure line entities I was raised with; they are ecosystems more complex than Jamaica Bay.

I like to think that they work in my interest, that each breath they draw for me, but perhaps it is they who walk through the local park in the early morning, sensing my senses, listening to my music, thinking my thoughts.

I am consoled, somewhat, by the thought that the green plants are in the same fix. They could not be plants, or green, without their chloroplasts, which run the photosynthetic enterprise and generate oxygen for the rest of us. As it turns out,

chloroplasts are also separate creatures with their own genomes, speaking their own language.

We carry stores of DNA in our nuclei that may have come in, at one time or another, from the fusion of ancestral cells and the linking of ancestral organisms in symbiosis. Our genomes are catalogues of instructions from all kinds of sources in nature, filed for all kinds of contingencies. As for me, I am grateful for differentiation and speciation, but I cannot feel as separate an entity as I did a few years ago, before I was told these things, nor, I should think, can anyone else.

3

Item. The uniformity of the earth's life, more astonishing than its diversity, is accountable by the high probability that we derived, originally, from some single cell, fertilized in a bolt of lightning as the earth cooled. It is from the progeny of this parent cell that we take our looks; we still share genes around, and the resemblance of the enzymes of grasses to those of whales is a family resemblance.

The viruses, instead of being single-minded agents of disease and death, now begin to look more like mobile genes. Evolution is still an infinitely long and tedious biologic game, with only the winners staying at the table, but the rules are beginning to look more flexible. We live in a dancing matrix of viruses; they dart, rather like bees, from organism to organism, from plant to insect to mammal to me and back again, and into the sea, tugging along pieces of this genome, strings of genes from that, transplanting grafts of DNA, passing around heredity as though at a great party. They may be a mechanism for keeping new, mutant kinds of DNA in the widest circulation among us. If this is true, the odd virus disease, on which we must focus so much of our attention in medicine, may be looked on as an accident, something dropped.

4

Item. I have been trying to think of the earth as a kind of organism, but it is no go. I cannot think of it this way. It is too big, too complex, with too many working parts lacking visible connections. The other night, driving through a hilly, wooded part of southern New England, I wondered about this. If not like an organism, what is it like, what is it most like? Then, satisfactorily for that moment, it came to me: it is most like a single cell.

*Excerpt from Lives of a Cell: Notes of a Biology Watcher, by Lewis Thomas 1978

Name _____ Date _____ Block _____

Split Screen Notes for "Lives of a Cell" by Lewis Thomas

1	Quotes from text	Pictures
	Summary of section:	
2	Quotes from text	Pictures
	Summary of section:	

3	Quotes from text	Pictures
	Summary of section:	
4	Quotes from text	Pictures
	Summary of section:	

Science Argumentative Writing Scoring Rubric

Write arguments to support claims in an analysis of substantive topics or texts, using valid reason and relevant and sufficient evidence.

	Poor	Developing	Meeting
Introduction	Introduction is not a complete thought or is missing.	Introduction does not outline the claim, counterclaim, reasons and evidence.	Introduction is engaging and outlines the ideas of the writing.
Claim (Takes a Position)	Claim is not present or it does not address relevance/significance of the topic. A convincing argument is not made.	A general claim is present. Acknowledges the relevance but does not explain the importance of the topic.	A precise developed claim is present. Explains the relevancy and importance of the topic.
Counterclaim (Addresses alternatives)	Counterclaim is not present or irrelevant.	There is not a clear distinction between the claim and counterclaim. Some minor errors are present in the counterclaim.	Explains the strengths and limitations of a distinguished relevant counterclaim.
Evidence (Develops ideas with examples)	Evidence is wrong, repetitive or irrelevant.	Only one piece of evidence (observation or data) is used. Evidence has minor mistakes and is not explained in detail.	Multiple pieces of evidence (observations and data, analysis, or research, etc.) are relevant, accurate and thoroughly explained.
Reasoning / Justification (Explain how the evidence supports the claim)	Specific reasoning for the claim is not stated. Makes simple assertion that the evidence “proves it” or it simple refers to the evidence without explaining it.	Some reasons are more supported than others. Explains why the evidence was included or how the evidence supports the explanation but	Claim is well-supported. Explains why the evidence was included and how the evidence supports the explanation.

		not both.	
Science Content/ Background	The topic is not developed and contains major mistakes.	The topic is explained, but minor mistakes are made.	Accurate scientific information is included throughout the writing. Links evidence to an important concept or principle.
Vocabulary	Science vocabulary is not used correctly.	Science vocabulary is used with minor mistakes in their definitions.	Uses a variety of science vocabulary correctly.
Style and Organization	Formal style is not present. Complete sentences are not used. There is no specific focus. There are major grammatical mistakes. There are no transitions between ideas. There is no clarity in the writing.	Formal style is inconsistent. Complete sentences are used but informal language is present. Main ideas are clear, but stray from the claim. Some grammatical mistakes are made. Transitions are used but do not connect ideas.	Formal style reflects an objective tone. Creates a logical structure with complete sentences and paragraphs. Focus is always on the claim. Grammar is used correctly. Transitions clarify relationships.
Concluding Statement	No concluding statement present that summarizes the argument.	Provides a sense of closure. Concluding statement is present but the statement does not reflect the argument presented.	Concluding statement supports the argument and explains implications. Statements are not repeated from the introduction.

2 Things you did well on:	2 Things you need to work on: