CER: Evolutionary Rates and Natural Selection



What is C.E.R.?

C.E.R. stands for **Claim**, **Evidence**, **and Reasoning**. It's a way to explain and support your ideas using facts and logical thinking. You will make a claim, back it up with evidence, and explain why the evidence supports your claim. This process helps you think critically and organize your ideas clearly.

Steps for Writing Your C.E.R. Response:

1. **Read the Article** Carefully:

 First, read the background article about how plants and body systems work together. Make sure you understand the key ideas in the article.



2. Write Your Claim:

- Your claim is your main idea or statement that answers the question. It is your position or opinion about the topic.
- Use the **Claim Sentence Starter** to help you get started. This will guide you in making a strong, clear statement.

• Example:

The respiratory, circulatory, and muscular systems work together to maintain essential body functions by...

• **Highlight** the section in the article that helps support your claim.

3. Provide Evidence:

- **Evidence** is the facts, data, or information from the article that supports your claim. You need to find at least **four pieces of evidence** from the article.
- Evidence can include details like descriptions, examples, or data from the article.
- Example:

The respiratory system provides oxygen and removes carbon dioxide, which is needed by the cells for energy.

4. Explain the Evidence (Reasoning):

• **Reasoning** is how you explain why the evidence supports your claim. This is where you connect the dots between your claim and the evidence.

• Use the **Sentence Frames** to help you explain how the evidence proves your claim.

• Example:

"This piece of evidence supports my claim because it shows how the respiratory system supplies oxygen to the body, which is necessary for energy production."

5. Organize Your Writing:

- Your response should have three parts:
 - 1. Claim
 - 2. Evidence
 - 3. Reasoning
- Use the Sentence Starters and Frames to help guide your writing.

Background Article:

Evolution is the process by which species change over time. These changes can happen at different rates. In some cases, evolutionary change occurs slowly and steadily, while in others, it happens rapidly. The three main rates of evolutionary change are **gradualism**, **punctuated equilibrium**, and **stasis**. **Natural selection**, the process by which organisms with advantageous traits are more likely to survive and reproduce, plays a crucial role in these evolutionary processes.

Gradualism - Gradualism is the idea that evolutionary change happens **slowly** and **steadily** over long periods of time. According to this concept, small changes in a species accumulate over many generations, eventually leading to new species. This gradual process allows for the slow accumulation of genetic changes that make a species better suited to its environment. Fossils and genetic data support this view, showing evidence of slow changes in species over millions of years.

Abrupt Appearance - In contrast to gradualism, the theory of abrupt appearance suggests that species can **appear suddenly** in the fossil record without clear evidence of gradual change. This can happen when a species rapidly adapts to a new environment or when a new species forms quickly due to speciation. For example, after a mass extinction event, new species may appear rapidly to fill the empty ecological niches. This is called **Punctuated Equilibrium**.

Stasis - Some species show **little to no change** over long periods of time, a phenomenon called stasis. Species in stable environments often reach a point where they are well adapted and do not need to change. For example, horseshoe crabs have changed very little over millions of years because they are well suited to their environment.

Natural Selection and Populations - Natural selection is a key driver of evolution. However, natural selection affects **populations**, not individual organisms. Natural selection works by **favoring** individuals with **traits** that help them **survive** and **reproduce** in a particular environment. Over time, these advantageous traits become more common in the population. For example, in a population of animals with different fur colors, those with camouflage coloring are more likely to survive and pass on their traits to their offspring.

Conclusion - Different rates of evolutionary change, such as gradualism, abrupt appearance, and stasis, occur due to varying environmental pressures and the speed at which species adapt. Natural selection plays a vital role in shaping the evolution of species over time, acting on populations and favoring traits that improve survival and reproduction.

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Research Question

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How do different rates of evolutionary change, like gradualism, abrupt appearance, and stasis, occur, and how does natural selection affect populations?

Brainstorming / Turn & Talk - 2-3 minutes prior to writing anything!

Claims	Evidence	Reasoning	CHANK AND
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Your Response:				
Claim	 Does the answer match the question? (The answer should be about the question.) Does the answer explain why? (The answer should tell why.) Is the answer more than just "yes" or "no"? (The answer should be more than just "yes" or "no.") Is the answer a full sentence? (The answer should be a whole sentence.) 	Claim Sentence Starter: Different rates of evolutionary change, such as gradualism, abrupt appearance, and stasis, occur because Natural selection affects populations by (highlight the portion of the article you will refer to)		

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Evidence	 Do all the facts help? Are there enough facts to help? Are the facts only things seen or measured? Are the facts very clear? The article says that [insert evidence]. This means that 	 Gradualism shows that Abrupt appearance of species can happen due to Stasis occurs when species remain Natural selection works on
Reasoning	 Does each reason explain why? Does each reason connect to the answer? Does each reason tell why the fact supports the answer? Are the reasons written in whole sentences? 	"This evidence supports my claim because it shows how different evolutionary patterns occur, and how natural selection favors certain traits in populations. For example, [explain how the evidence shows these processes work]."

Date: _____

Final Draft: Putting it Together:

