

# Life Sciences Samples

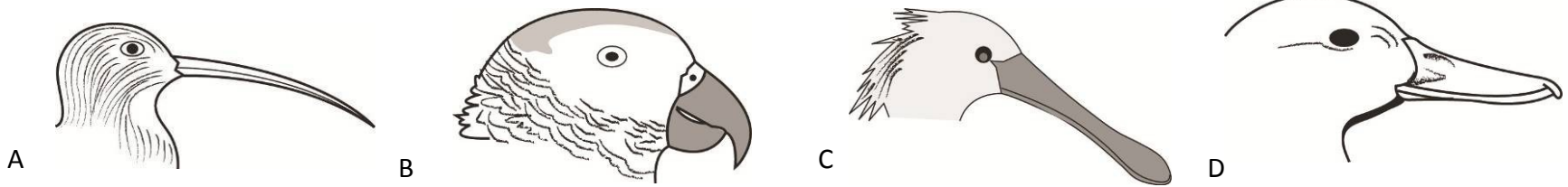
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**Grade:** 4

**State:** West Virginia

**Standard:** SC.O.3.2.03 Students will compare physical characteristics and behaviors of living organisms and explain how they are adapted to a specific environment (e.g., beaks and feet in birds, seed dispersal, camouflage, or different types of flowers).

Which of these beaks is best adapted to feeding on nuts and seeds?.



### Distractor Analysis

A. Students might believe that all birds can feed on all types of food. The Curlew's long and narrow beak is adapted to search for insects in the mud.

B. Key. Parrots have a strong curved beak that is adapted to eat fruits and nuts.

C. Spoonbills have a flat and broad beak that is adapted to search for small water insects and fish.

D. Ducks have a beak that is adapted to search for food in water, and it is not designed to eat fruits and nuts.

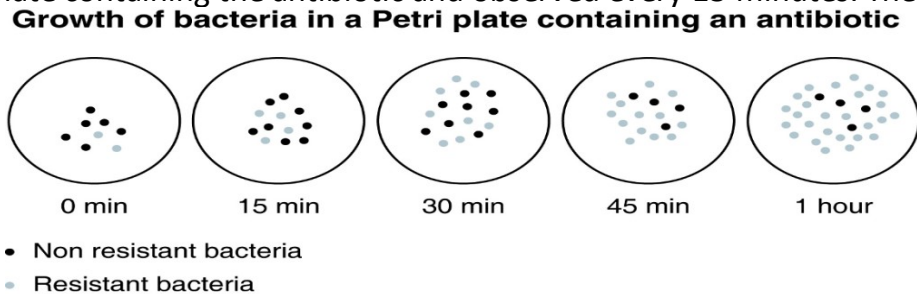
Grade: 11

State: NECAP



**Standard:** Given information about living or extinct organisms, cite evidence to explain the frequency of inherited characteristics of organisms in a population, OR explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers).

An experiment was conducted to study the resistance of bacteria to a common antibiotic. The bacteria were grown in a Petri plate containing the antibiotic and observed every 15 minutes. The data are shown in the diagram below.



Which is the **most likely** explanation for the increase in the number of resistant bacteria?

- A. The antibiotic resistant bacteria survived and increased in number.\*
- B. The antibiotic resistant bacteria destroyed the non-resistant bacteria.
- C. The non-resistant bacteria converted themselves into resistant bacteria.
- D. The non-resistant bacteria were immediately destroyed by the antibiotic.

**Distractor analysis**

- A. Key.
- B. The antibiotic resistant bacteria can survive in the presence of the antibiotic, but they do not have any specific ways to destroy non-resistant bacteria.
- C. Bacteria are either resistant or non-resistant, depending on their genetics. They cannot convert themselves from one to another.
- D. The data indicate that some non-resistant bacteria survived the entire hour, and some even reproduced in the first 15 minutes.



**Grade:** 9-12

**State:** EOC North Carolina

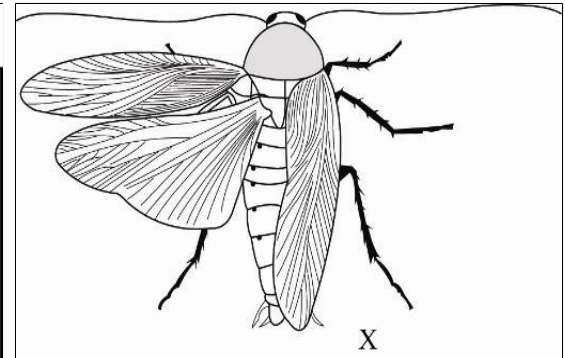
**Standard:** Analyze the classification of organisms according to their evolutionary relationships.

- a. The historical development and changing nature of classification systems.
- b. Similarities and differences between eukaryotic and prokaryotic organisms.
- c. Similarities and differences among the eukaryotic kingdoms: Protists, Fungi, Plants, Animals.
- d. Classify organisms using keys.

Use the key provided, drawing X can be identified as which insect?

**Taxonomic Key for Insect Classification**

1a. Insect with wings for flight .....	2
1b. Insects without wings or with false wings not meant for flight .....	3
2a. One pair of wings.....	<i>Gryllus campestris</i>
2b. Two pair of wings.....	4
3a. Antennae slender, with 5 or less segments .....	<i>Melanocoryphus albomaculatus</i>
3b. Antennae short and stubby.....	<i>Phyllium bioculatum</i>
4a. Hind legs enlarged and modified for jumping .....	<i>Schistocerca gregaria</i>
4b. Hind legs and middle legs are similar in thickness.....	<i>Periplaneta americana</i>



- A. *Gryllus campestris*
- B. *Melanocoryphus albomaculatus*
- C. \* *Periplaneta americana*
- D. *Schistocerca gregaria*



**Grade:** 9-12

**State:** EOC North Carolina

**Standard:** Analyze the molecular basis of heredity including:

- DNA replication.
- Protein synthesis (transcription, translation).
- Protein Synthesis.

The chart represents the amino acids that code for mRNA codons.

Which protein would be coded for by the m-RNA sequence  
5' UCU AUG ACC CCG GGG UGG UGA UUU AAA 3'?

- \* Met Thr Pro Gly Trp
- Ser Met Thr Pro Gly Trp
- Met Thr Pro Gly Trp Trp Phe Lys
- Ser Met Thr Pro Gly Trp Trp Phe Lys

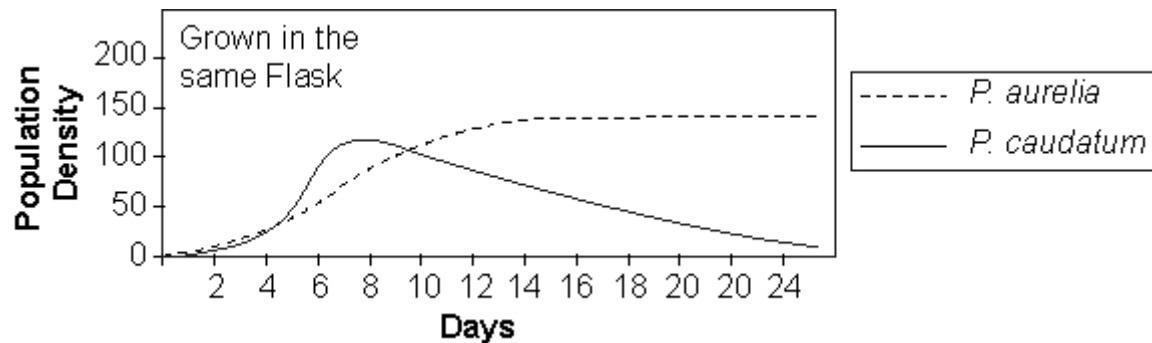
		Codons in mRNA					
		Second letter					
		U	C	A	G		
First letter	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp	U C A G	
	C	CUU } Leu CUC } CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } Arg CGC } CGA } CGG }	U C A G	
	A	AUU } Ile AUC } AUA } AUG } Start or Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	U C A G	
	G	GUU } Val GUC } GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } Gly GGC } GGA } GGG }	U C A G	
						Third letter	

**Grade:** 10

**State:** Connecticut

**Standard:** Articulate conclusions and explanations based on research data, and assess results based on the design of the experiment.

In an experiment, two species of paramecium were grown in the same flask containing a growth medium. The growth patterns of the two paramecium species were recorded in the graph below.



What conclusion can be made about the relationship shared between the two paramecia?

- A.\* both the paramecia are competing with each other
- B. both the paramecia are supporting each other's growth
- C. one paramecium benefits from the relationship while the other is harmed
- D. one paramecium benefits from the relationship while the other is unharmed

**Grade:** 10

**State:** Connecticut

**Standard:** Debate the ethical and political issues associated with stem cell research, and how these affect research. Explain the process differentiation of cells.

The data below shows federal funding of stem cell research in the United States.

**Federal Funding of Stem Cell Research 2003-2008**  
*(in \$ millions; figures have been rounded)*

Type of Research	2003	2004	2005	2006	2007	2008
Human, Embryonic	20	24	40	38	37	37
Non-Human, Embryonic	113	89	97	110	110	109
Human, Non-Embryonic	191	203	199	206	206	205
Non-Human, Non-Embryonic	192	236	273	289	288	287
<b>Total</b>	<b>517</b>	<b>553</b>	<b>609</b>	<b>643</b>	<b>641</b>	<b>639</b>

Which of these statements is true based on the above data?

- A. \* Human embryonic stem cell research has the least funding as the ethical concerns regarding it remains unresolved.
- B. Human embryonic and non-embryonic stem cell research has received less funding as human cells are rarely used for research purpose.
- C. Non embryonic stem cell research has received more funding as study of these cells will help find therapeutic cures faster.
- D. Non-human stem cell research has received more funding as studies on these cells are easier.