

**BIOL 1114 Exam #4 (Preview) December 8, 2016**

Use a #2 pencil to fill in the information on your NCS answer sheet. Put your **O-Key Account Username** in the boxes indicated for **LAST NAME** and darken the appropriate circles. **Write your Name (Last, First)** and “Star” or “NoStar” **in the space above the boxes containing your O-Key Account Username**. Darken the (S) or (N) in the **last column of the name circles**. Enter the number **1634** and **darken the corresponding circles in the first 4 columns** of the “**Student ID.**” Failure to perform this correctly will incur a **-10pt handling fee**. Read all questions and answers *carefully* before choosing the **single BEST response** for each question. Feel free to ask the instructor for clarification.

mRNA-Codon-to-Amino-Acid Decoder Chart									
1 <sup>st</sup> Letter	2 <sup>nd</sup> Letter								3 <sup>rd</sup> Letter
	U		C		A		G		
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine	UCA			STOP		STOP	A
	UUG		UCG		UGG		Tryptophan	G	
C	CUU	Leucine	CCU	Proline	CAU	Histidine	CGU	Arginine	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Glutamine	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Isoleucine	ACU	Threonine	AAU	Asparagine	AGU	Serine	U
	AUC		ACC		AAC		AGC		C
	AUA	ACA	AAA		Lysine	AGA	Arginine	A	
	AUG	Methionine; START	ACG			AGG		G	
G	GUU	Valine	GCU	Alanine	GAU	Aspartate	GGU	Glycine	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glutamate	GGA		A
	GUG		GCG		GAG		GGG		G

Important Equations:	$r = b - d$	$G = rN$	$G = rN [(K - N) / K]$
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White Sands National Monument in New Mexico is a unique desert habitat that has existed for only about 10,000 years, less time than humans have been in North America. Bree Rosenblum and colleagues from UC Berkeley are comparing whiptail lizards (*Aspidoscelis inornata*) and fence lizards (*Sceloporus cowlesi*) that have colonized the white dunes to the same species in surrounding darker/vegetated areas. *A. inornata* individuals living on the white sand are light-colored, while those in darker surrounding habitats show the dark, striped pattern that their ancestors did. A small percentage of the ancestral population consisted of white lizards. The color of individual lizards is genetically determined. The scientists also determined that there are fewer birds and snakes (the lizards’ main predators) in the center of the dunes, far from the dark/vegetated margins (Refsnider et al. 2015).

<i>Sceloporus cowlesi</i> male home range size (space used, m <sup>2</sup> )			
Habitat	Minimum	Mean (average)	Maximum
Central dunes	100	1,000	7,700
Dark vegetated zones	105	950	3,800

Refsnider, J.M., S. Des Roches & E. B. Rosenblum. 2015. Evidence for ecological release over a fine spatial scale in a lizard from the White Sands formation. *Oikos* 124: 1624–1631.

Syndactyly is a hereditary condition affecting 1 in 2,500 babies in which certain fingers and/or toes are fused (joined) together. Genetic mutations leading to this condition are generally autosomal dominant alleles.

Some tribes from the Amazonian Rainforest use lianas (vines) to capture fish. They put the liana in the water and fish either becomes inactive or rise to the creek surface in an attempt to gulp air. Thereafter, natives select the fish they use for food, for example, if the fish is young or a female carrying eggs, they release it. If the fish is a male and old, they keep it for food. The lianas release an active compound that affects most but not all of the ATP production during cellular respiration.

Imagine you are an Anthropologist studying the behavior of such tribes in the Amazonian Rainforest in the 18<sup>th</sup> century and the chief of one tribe invites you to fish. You see the whole activity the chief performs from placing the liana in the water to capturing the fish.

A variety of fish species are brought to USA through the pet trade from the Amazonian Rivers. Sometimes a few of these fish are released into lakes, rivers and creeks. Most of the time they survive and establish a new population.

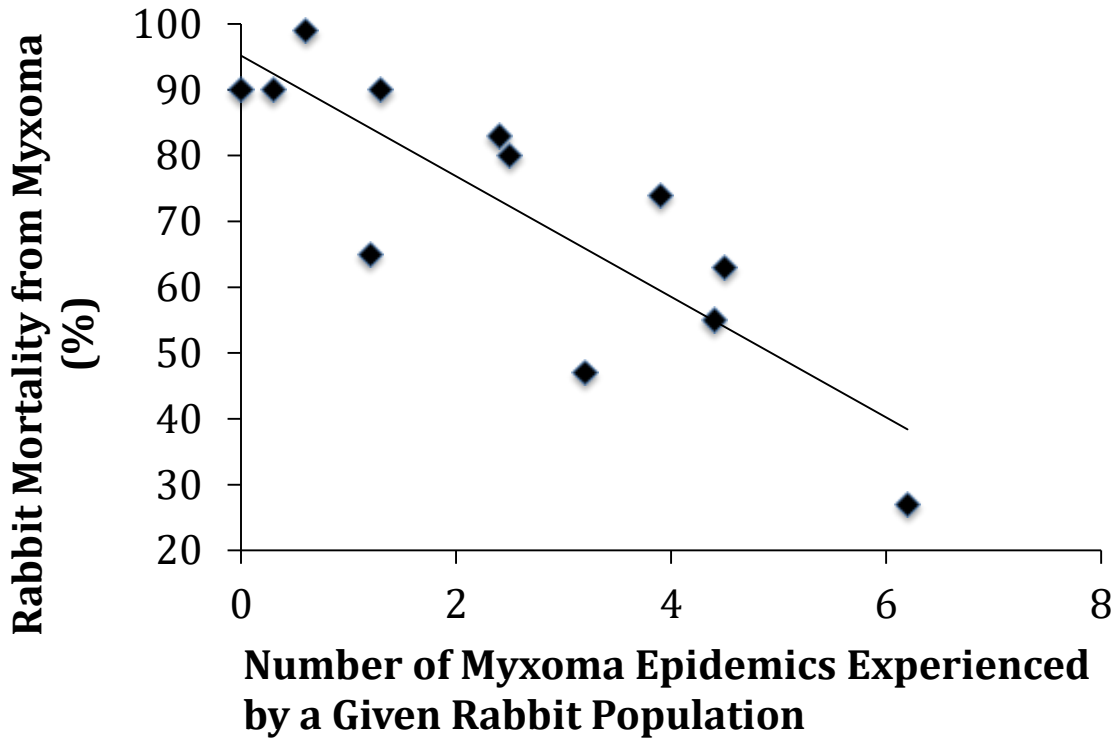
Vinicius Santos is a senior in a high school at Belem (Brazil). His teacher asked him to develop an experiment where he can observe evolutionary forces such as natural selection, mutation, etc. He collected several females of *Poecilia formosa* (a mosquitofish) from the nearby creek and selected five that were pregnant. He brought these five females to the lab and put each one in a different container and provided names for each. He designed the table below with his data.

OBSERVABLE BEHAVIOR	LUCY	GLORIA	MARINA	ANTONIA	SANTA
Number of baby fish born	10	15	11	20	5
Number of baby fish reaching adulthood	3	3	2	0	4
Days female survives after releasing the babies	15	4	10	20	30
Care of the female for its babies	Absent	Absent	Present	Present	Present

Every spring, the OSU groundskeepers fertilize the university lawns. Often the spring rains wash some of this fertilizer (that includes nitrogen) into Theta pond, stimulating an exponential growth (bloom) of algae, causing the pond to appear green. One toxin produced during some algal blooms is domoic acid, which is known to **biomagnify** within food chains. Only animals that accumulate high concentrations of domoic acid will experience seizures and sometimes death.

Methylmercury is an organic form of mercury (a naturally occurring metal) that can be released into the environment in large amounts from industrial processes. Longhorn Army Ammunition Plant is an 8,493-acre facility near Karnack, TX that was contracted to produce dynamite during World War II. Caddo Lake is located on the site, and as a result of the industrial processes involved in producing dynamite, is contaminated with methylmercury. Dr. Paul Lucian, is studying the effects of methylmercury on cottonmouth snakes (*Agkistrodon piscivorus*) and has measured concentrations of methylmercury in the tissues of *A. piscivorus* as well as in their prey. Mercury in the body is detoxified by binding with a type of protein called metallothionein.

The figure on the below was made with data from the introduced European rabbit (*Oryctolagus cuniculus*) and the *Myxoma* virus in Australia.



From:

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*Tribolium* flour beetles (Coleoptera: Tenebrionidae), are a well-studied and economically important agricultural pest that colonize grain storage facilities. *Tribolium* males produce a pheromone (chemicals released into the environment that affect others of its species) that attracts both sexes. There is some evidence supporting the hypothesis that females are attracted to the odors of certain males. *Tribolium* females often mate again after rejecting sperm packets from males with low phenotypic quality (e.g. starving males). Neither males nor females provide care for eggs once they are deposited. *Tribolium* flour beetles show distinct male and female differences such as the presence of glands.

Fedina, T.Y. and Lewis, S. M. 2008. An integrative view of sexual selection in *Tribolium* flour beetles *Biological Reviews* 83(2): 151 – 171.