

**BIOL 1114 Exam #3 (Preview) April 9, 2012**

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 **1213** 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.

*Use the following formulas and chart as needed.*

$\text{birth rate}(b) = \frac{\text{births}}{N}$     
  $\text{death rate}(d) = \frac{\text{deaths}}{N}$     
  $r = \frac{\text{births} - \text{deaths}}{N}$     
  $G = rN$     
  $G = rN(K - N)$

mRNA-Codon-to-Amino-Acid Decoder Chart									
1 <sup>st</sup> Letter	U	2 <sup>nd</sup> Letter						3 <sup>rd</sup> Letter	
			C		A		G		
U	UUU	Phenylalanine	UCU	Serine	UAU	Tyrosine	UGU	Cysteine	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine	UCA		UAA	STOP	UGA	STOP	A
	UUG		UCG		UAG		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		AAG		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

The Royal Kingdoms are in crisis: A raid by the Queen of Hearts has resulted in the kidnapping of 2 infant princes (the Jack of Clubs & the Jack of Diamonds), respective sons of the King & Queen of Clubs and the King & Queen of Diamonds. The merciless Queen of Hearts holds the boys for 20 years until their parents can raise ransom money. The heartbroken monarchs must request help from Alice, who agrees to help raise money to pay the ransom. Unfortunately, after the ransom was paid, the 2 princes are returned together without any identification as to who's who! Shortly afterward, however, the royal geneticist solves the mystery.

<u>Person</u>	<u>Sex</u>	<u>Colorblindness</u> Color-blindness is X-linked recessive.	<u>Blood type</u> Multiple alleles	<u>Thumb-shape</u> Curved thumb is autosomal dominant; straight thumb is recessive.	<i>Notes</i>
<b>Adults</b>					
♣ Queen of Clubs	♀	Normal Vision	AB	Straight	married to King of Clubs
♣ King of Clubs	♂	Colorblind	B	Curved	married to Queen of Clubs
♦ Queen of Diamonds	♀	Normal Vision	A	Straight	married to King of Diamonds
♦ King of Diamonds	♂	Colorblind	O	Curved	married to Queen of Diamonds
<b>Children</b>					
♣ Jack of Clubs	♂	Normal Vision	AB	Curved	kidnapped and held for ransom
♦ Jack of Diamonds	♂	Colorblind	O	Straight	kidnapped and held for ransom
Alice	♀	Colorblind	B	Straight	an adoptee of unknown parents

Amphipods are small crustaceans that inhabit most lakes. Populations grow rapidly in the spring, stabilize in the summer, and begin to decline in the fall.

A researcher interested in understanding the impact of a bacterial parasite on amphipod populations builds an artificial tank and introduces 5000 amphipods early in the spring. After a month, under spring conditions, she notes that there were 1000 births, and 200 deaths.

Polycystic kidney disease (PKD), adult type I is caused by any one of over 200 mutations in the PKD1 gene, which is located on chromosome 16 and starts at nucleotide 2,138,710. The protein that is normally produced by this gene is polycystin-1, which works with polycystin-2 to form a protein complex that appears to be involved in signaling between cells. Those with PKD suffer

from the growth of multiple cysts on their kidneys that ultimately result in kidney failure. One form of the polycystin-1 protein is 4303 amino acids long.

The plague is an infectious disease of humans and rodents is caused by the bacterium *Yersinia pestis*. In nature the bacterium circulates among small rodents and their fleas. People become infected when a rat flea carrying the bacterium bites a human. Without treatment, the bubonic plague kills about two out of three infected humans within 4 days. The Bubonic plague or otherwise known as the Black Death swept through Europe in the 14th century and killed an estimated 25 million people, or 30–60% of the European population! During the 14th century in Paris, France, Maria and her entire family were exposed to *Yersinia pestis*, because their house was overrun with rats and the rat fleas infected with *Y. pestis*. Both Maria and her brother contracted the disease as did their mother. However, Maria's father did not contract the disease even though he was bitten by infected fleas numerous times.

During the course of the infection, Maria, her brother, and mother all developed the typical buboes clinical signs of the disease. However, both Maria and her brother survived the disease, whereas their mother died. After the passing of their mother, the remaining family moved to the southern part of France. A few years later, in the southern part of France in the village that Maria and her remaining family resided developed an epidemic of plague. However, Maria and her brother did not develop any clinical signs of the disease and only came down with a very mild form of plague.

During the 14th century the plague outbreak of 1348 was the worst on record. By 1348, overpopulation was rampant in many parts of Europe, Europeans could not grow enough food to feed their population and trade was as well-established. It is hypothesized that plague arrived in Europe through a port in Italy by a ship trading goods from Asia. After the devastating outbreak of 1348, plague continued to sweep through Europe until the 19th century. However, mortality was much lower in the human population in subsequent epidemics.