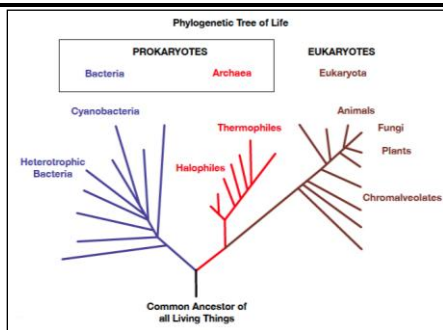


BIOL 1114 Exam #4 (STAR Form) December 10th, 2012

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”** in the space above the boxes containing your **O-Key Account Username**. Darken the **(S)** in the **last column of the name circles**. Enter the number **1234** and **darken the corresponding circles** in the **first 3 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 st Letter	2 nd Letter								3 rd Letter
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	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

important equations: $r = b - d$ $G = r N$ $G = r N [(K-N)/K]$



Carl Woese (University of Illinois) revolutionized the classification of life by reflecting the evolutionary origins of all species: He abandoned the old method of dividing life into Kingdoms and hypothesized the illustrated “Three Domains” scheme in which all life can be classified into either Bacteria and Archaea (both prokaryotes) or Eukaryota (all eukaryotes). In the diagram, if organisms are

closely related, they are close together within the tree of life.

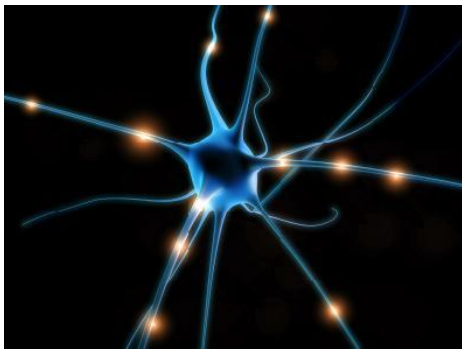
According to the “Three Domains” hypothesis, all animals and plants are most closely related to fungi. www.oceanclassrooms.com



Mushrooms are not photosynthetic and obtain much of their food by decomposing glucose-rich compounds through respiration. Therefore, biochemical reactions within their cells are different from cells of photosynthesizing organisms.

Fungi in a forest are decomposing dead plant and animal matter. This results in the release of large quantities of carbon compounds, nitrates and phosphates into the soil. Plants can then absorb these Nitrates for their cellular use.

The ambient temperature influences the biochemical reaction speed of a mushroom's enzymes.



Proper functionality of Na^+/K^+ Pumps within the membrane of neurons is essential to the transmission of action potentials.

Acetylcholinesterase is one of the enzymes responsible for degrading the neurotransmitter Acetylcholine within the synaptic space.

Acetylcholinesterase is a protein encoded by 615 codons (excluding the stop codon).

If codon number 84 of the acetylcholinesterase gene is mutated in such a way that tryptophan is changed to alanine, there is a 3000-fold decrease in acetylcholinesterase activity.



Grand Lake is located in northeastern Oklahoma. Despite its lovely scenery and excellent fishing, there are several environmental issues to contend with including mercury contamination, eutrophication, occasional harmful algal blooms, and zebra mussels (an invasive species). Within the lake there is a complex food web. Part of the web includes algae (primary producers), waterfleas (primary consumer), bluegill sunfish (secondary consumer), and largemouth bass (tertiary consumer).



Zebra mussels are an invasive species that grow rapidly and out-compete native mussels. They do not have natural predators in the region.



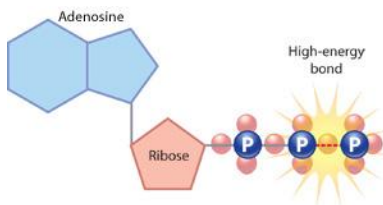
LeptoTrim® is a diet pill (not FDA-approved), derived from asparagus proteins, whose manufacturers claim that: “LeptoTrim works in two steps: it helps you shed excess water weight and then it works on detoxifying your system to expel fats from your body. The extracts from the asparagus work as a diuretic.” No published data, however, is currently available confirming this claim.

The company’s statement on the product’s mode of action reads: “LeptoTrim works in two steps: It helps you shed excess water weight, and then it works on detoxifying your system to expel fats and toxins from your body.”

LeptoTrim is said to work as a “diuretic”, and to “expel fat from your body”.



A cat with a normally functioning leptin system has become overweight. After a low calorie diet, it has undergone an extreme weight loss. A vet provided some leptin injections to the cat, and measures a decrease in the blood concentration of neuropeptide Y (NPY), a small protein that increases the cat’s appetite. The vet made observations on the cat’s appetite and hormone levels.



Many biological processes involve the use of ATP as a source of cellular energy.



Carbon (C) moves to and from living and dead organisms and the physical environment in what is called the carbon biogeochemical cycle. Researchers are able to give a photosynthesizing plant CO₂ with a traceable radioactive carbon. This radioactive carbon is incorporated into sugars in the Calvin cycle of photosynthesis. Later, when the sugars are metabolized by the plant and/or moved to other organisms or the physical environment, it is possible

to detect and locate the radioactive carbon.

A photosynthesizing plant was given CO₂ with radioactive carbon until it produced and accumulated a substantial amount of sugars with-containing radioactive carbons. This plant (#1) and another plant (#2) that had not been given CO₂ with radioactive carbon were put together in one sealed, transparent glass container with normal air (without any addition of CO₂ with radioactive carbon). Measurements of O₂ in the glass container and sugars within the plants were taken.

Abraham and Sarah have a color-blind daughter named Rebecca. Color-blindness is an X-linked recessive trait.

Joseph and Rachel have 4 kids with 4 different blood types: Simon-type A, Levi-type B, Asher-type AB, and Joshua-type O. The alleles for these blood types are autosomal and show codominance.

In humans the allele for brown eyes is dominant to the allele for blue eyes. The brown-eyed Jeremiah and the brown-eyed Miriam are expecting a boy (to be named Nathan.) The couple has an older son, Joel, with blue eyes.

Jeremiah is 6-feet tall and weighs 240lbs. Joel is 6-feet tall and weighs 130lbs. They are both taking a swim in the cold water of the Pacific Ocean near Carmel.

The following sequence of a nucleic acid from within a gene includes a few codons for amino acids and may include also a stop codon: GGAGTATTGATTCTACCG. Translation uses the genetic code to produce a polypeptide chain made of amino acids.



In certain species offspring survive much better when both parents are taking care of them versus when only one parent is taking care of them.



If you cutoff a reindeer's antlers they lose fights with other males and are driven away from females.



The variation of running speed in cheetahs is heritable, and cheetahs that can run faster can catch more food.



Lake Malawi in Africa is renowned for its diversity of cichlid fish. Several hundred species of cichlids are found in Lake Malawi, and each of them has rapidly specialized to a particular feeding niche and they all evolved from a single ancestral cichlid.



A soybean field was sprayed with DDT, a biomagnifiable pesticide.



The island of New Guinea has an incredible diversity of birds, but is most well known for the birds of paradise and bowerbirds. Males of these species have elaborate displays of colorful and extravagant plumages, ritualized dances, and even architectural building skills.

The island of New Britain is a smaller island to the east of New Guinea, and it does not have any species of bowerbirds and birds of paradise. A newly established population of bowerbirds has been documented on the island of New Britain.

Besides the well known bird diversity, New Guinea is also renowned for its diversity of mammals, of which tree kangaroos are an integral part. Tree kangaroos can serve as hosts for some parasites called lungworms. The lungworms live part of their lifecycle in earthworms and part in tree kangaroos. Biologists suggest that today's

lungworms harm the tree kangaroos less than they did many hundreds of thousands of years ago because of adaptations in both the parasite and the tree kangaroos.



Chilean Flamingos use their long legs to wade through water for prolonged hours in search for food. The waters in the alpine lakes of the Chilean Andes is extremely cold, yet the flamingoes never experience any significant changes in their core body temperature.



Andy loves marine fish and his parents surprised him with a beautiful saltwater aquarium last Christmas. Each year he has to replace the sand in the aquarium, and for that he has to take out all 10 of his marine fish and place them temporarily in buckets filled with salt water. This year, his sister Sandy is helping out, but she forgot to use salt water in one of the buckets and instead filled it with tap water.



While working on a class project in the university wood shop, you made a careless mistake and suffered an injury. As a result of having lost quite a lot of blood, one of your classmates has driven you to the emergency room. Your blood type is **AB**.



Should the Hawaiian island of Kauai have a volcanic eruption, it would most likely eliminate a very large part of the population of the endemic honeycreeper, *Hemignathus kauaiensis*.

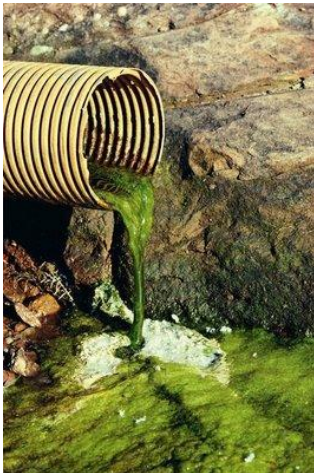
As you are pedaling on your bicycle, your leg muscles are in great need of energy.



You are working as a biologist at an organic produce farm, trying to improve the yields of eggplants. In a greenhouse, you manipulated the conditions and found that 100 eggplants grown at 22°C **with** nitrogen added to the soil yielded an average of 3.2 eggplants/plant. Another batch of 100 eggplants grown at 25°C **without** nitrogen added to the soil yielded an average of 4.6 eggplants/plant. Your boss is not very happy about this

experiment.

While working on the eggplants in the greenhouse, you observe that plants with larger leaves yield more eggplants, but there is no way your boss will allow you to manipulate the leaf sizes of the plants.



A factory that makes pet food releases its wastewater into a small river. Environmentalists are concerned that the river is being damaged. In order to test for potential impacts, they collected wastewater from the factory and setup an experiment. They added some of the wastewater to four beakers that already contained river water collected upstream from the factory and as a control they added clean water to four additional beakers that also contained upstream river water. After 72 h in naturally lighted conditions, they measure dissolved oxygen and chlorophyll a in each beaker.

The scientists found that the dissolved oxygen in the water dropped when the factory's wastewater was added.

However, the addition of wastewater did not result in changes to chlorophyll a concentrations.



At this time of year, the virus that causes the flu is found circulating among the population. Students that come down with the flu often have headaches and fever. The fever is often accompanied by flushed (reddening) cheeks.