Mr. Gumpert's Final Study Guide

BIG IDEAS: There is little imagination when naming things in biology. Many enzymes and structures are named based on what they look like or what they do. All living things (of which we know) have a lot in common, such as using nucleic acid to store and transmit their genetic information, and enclosing their cells with a lipid bilayer.

DNA

Match the scientist with their contribution to what we know about DNA.

1. _G__ Discovered “nuclein” by studying used bandages from a hospital — A) Franklin

2. _C__ Found that amounts of Adenine = Thymine and Cytosine = Guanine — C) Chargaff

3. __A_ Used x-ray diffraction to take the first clear picture of DNA — G) Miescher

4. __T_ Built the first model of the DNA molecule — T) Watson/Crick

5. What does DNA stand for? ___Deoxyribonucleic Acid_____

6. What does DNA Helicase do? __Unzips the double helix during DNA replication_____

7. What do ribosomes do? __Read mRNA and assemble amino acids into protein___

8. Fill in the blanks in the Central Dogma of Molecular Biology:

DNA __transcription_____> RNA ____translation_____> Protein

9. Match the following DNA sequence with complementary base pairs.

T A C G A G C T C T T A T C A

A T G C T C G A G A A T A G T

10. Transcribe the DNA sequence into mRNA.

T A C G A G C T C T T A T C A

A U G C U C G A G A A U A G U

11. Translate the mRNA codons into amino acids.

AUG	AAG	CAC	UAC	GGA	UAA
__Methionine__	__Lysine____	__Histidine___	__Tyrosine___	____Glycine____	____Stop___

Evolution 1

Match the term on the right with its definition / example on the left. (1 each)

1. _J_ In 1809, proposed the idea of inheritance of acquired traits
2. _E_ Fitness curve shifts to one side
3. _T_ One bird sings a song another bird doesn't recognize
4. _S_ Populations are separated by a mountain range
5. _A_ In 1831, began a long voyage on the *HMS Beagle*
6. _B_ A population that can interbreed and produce fertile offspring
7. _I_ In 1858, Came to the same conclusion as Darwin while studying species distribution
8. _R_ Fitness curve compresses toward the center, "Medium is best"
9. _D_ Parts of a population are no longer able to interbreed

A. Charles Darwin
B. Species
D. Reproductive Isolation
E. Directional Selection
I. Alfred Wallace
J. Jean-Baptiste Lamarck
R. Stabilizing Selection
S. Geographic Isolation
T. Behavioral Isolation

10. (2) When I was in eighth grade, my friend had an idea to create an awesome flying pet by crossing a small dog with a peregrine falcon. Briefly explain why this probably wouldn't work.

__Dogs and falcons are different species / reproductively isolated_____

11. (2) What happened to the aggressive males of "Forest Troop" around 1984? _____

___They all died from tuberculosis after fighting for foraging rights in a garbage dump_____

Evolution 2

Match the term on the right with its definition / example on the left. (1 each)

1. _P_ Based on his hypothesis, people who dye their hair blue will have blue haired children
2. _A_ Could have been a household name, but let the other guy publish first
3. _C_ Structures with a common origin, but different functions. Example: Human arms and Bat wings
4. _K_ Structures with similar functions, but different origins Example: Eagle wings and Dragonfly wings
5. _E_ Took part in the original five year mission to explore strange new places and discover new life
6. _R_ An evolutionary leftover, like an organ or bone that's no longer used
7. _S_ The rapid development (on geologic time) of a new species

A. Alfred R. Wallace
C. Homologous Structure
E. Charles Darwin
K. Analogous Structure
P. Jean-Baptiste Lamarck
R. Vestigial Structure
S. Episodic Speciation

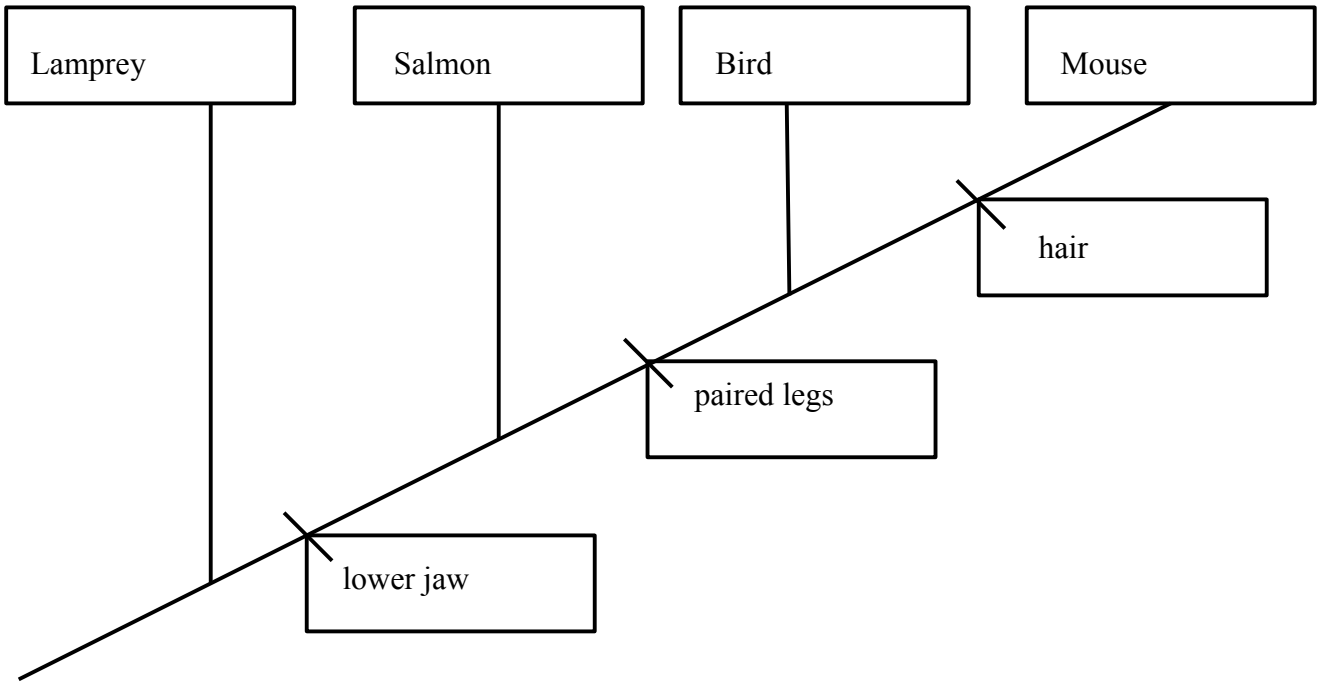
8. (3) Fill in the blanks on the phylogenetic tree below.

Life - _Domain_____ - Kingdom - Phylum - __Class_____ - Order -

Family - ___Genus_____ - Species

9. (7) Write the following items in the blank spaces on the cladogram. Each one will be used only once.

Lower Jaw Hair Paired Legs Bird Mouse Lamprey Salmon



Evolution 3

Match the term on the right with its definition / example on the left. No riddle this time. (1 each)

1. _Q_ One organism living inside another, probably led to mitochondria and chloroplasts
2. _G_ All of the available alleles in a population at any one time
3. _H_ Change in allele frequency following a massive die off
4. _D_ Change in allele frequency that results from the migration of a small population to a new area
5. _F_ Selective breeding of plants and animals to promote desired traits, like seedless bananas
6. _B_ Differential survival based on inherited traits, not influenced by humans
7. _A_ The loss of at least 50% of species in a single event, or short series
8. _E_ Measuring the amounts of certain radioactive elements to estimate the age of a rock or fossil
9. _C_ The time for a substance to reduce its mass by one half, also a video game featuring a guy named Gordon

A. Mass Extinction
B. Natural Selection
C. Half Life
D. Founder Event
E. Radiometric Dating
F. Artificial Selection
G. Gene Pool
H. Bottleneck Event
Q. Endosymbiosis

10. (1) Give an example of an endoparasite. "Worm" is not sufficient. You need to be more specific.

___Many options: tapeworm, liver fluke, heartworm_____

11. (1) Which isotope of Carbon is usually used in radiometric dating? __Carbon 14_____

12. (1) True / False Fossil fuels are made from dead dinosaurs.

13. (1) True / False Evidence suggests that birds modern day birds are directly descended from dinosaurs.

Genetics Quiz

Match the term on the right with its definition on the left. (1 each)

1. G_ Physical characteristic or trait
2. _R_ Always expressed when present in an organism
3. _E_ Genetic makeup / Allele combination
4. _T_ The father of modern genetics
5. _S_ Masked by another allele
6. _I_ Two different alleles
7. _M_ Two of the same allele

E. Genotype
G. Phenotype
I. Heterozygous
M. Homozygous
R. Dominant
S. Recessive
T. Gregor Mendel

8. (3) For real this time, list three characteristics of the pea plants that Mendel studied.

_____several options_____ _____ _____

9. (1) List an example of a Non-Mendelian Trait. _____many options_____

10. (4) Using the Punnett Square on the back, complete a dihybrid cross between two tall plants with round seeds (TtRr x TtRr). Take care to make your big letters and small letters look different.

Tip for making the gametes: F.O.I.L. T t R r

	T R	T r	t R	t r
TR	TTRR	TTRr	TtRR	TtRr
Tr	TTRr	TTrr	TtRr	Ttrr
tR	TtRR	TtRr	ttRR	ttRr
tr	TtRr	Ttrr	ttRr	ttrr

Taxonomy Quiz 1

Match the term on the right with its definition / example on the left. No riddle this time. (1 each)

1. _C_ Mutualistic relationship between a a fungus and an algae	A. Heterotrophic
2. _F_ Basically, it's the Dewey Decimal System of evolution	B. Carl Linnaeus
3. _H_ The sac-like spore producing structure in some fungi	C. Lichen
4. _B_ Swedish botanist who invented the classification system we have now	D. Budding
5. _J_ The cup or club like structure seen in many mushrooms	E. Saprophyte
6. _E_ An organism that feeds by decomposing another organism	F. Taxonomy
7. _A_ A general term for getting energy form other organisms	G. Mycorrhiza
8. _I_ Probably the oldest group of living things	H. Ascus
9. _G_ Mutualistic association between fungi and plants (particularly the roots)	I. Archaea
10. _D_ Reproducing by growing another copy off your side, the way that yeast do	J. Basidium

11. (2) In the 1984 version of Ghostbusters, Egon explains that as a hobby he "collects spores, molds, and fungus." What's redundant about this? _____

____Molds are a type of fungus, and fungi reproduce using spores_____

12. (1) True / False Although it's required for most complex life, oxygen is extremely toxic. This is why "healthy antioxidants" are a major selling point.

13. (2) List two of the rules for making up a new scientific name.

A__Latin or Latin-ish wording_____

____Not offensive_____

B___Unique to the species_____

____Can't name it after yourself_____

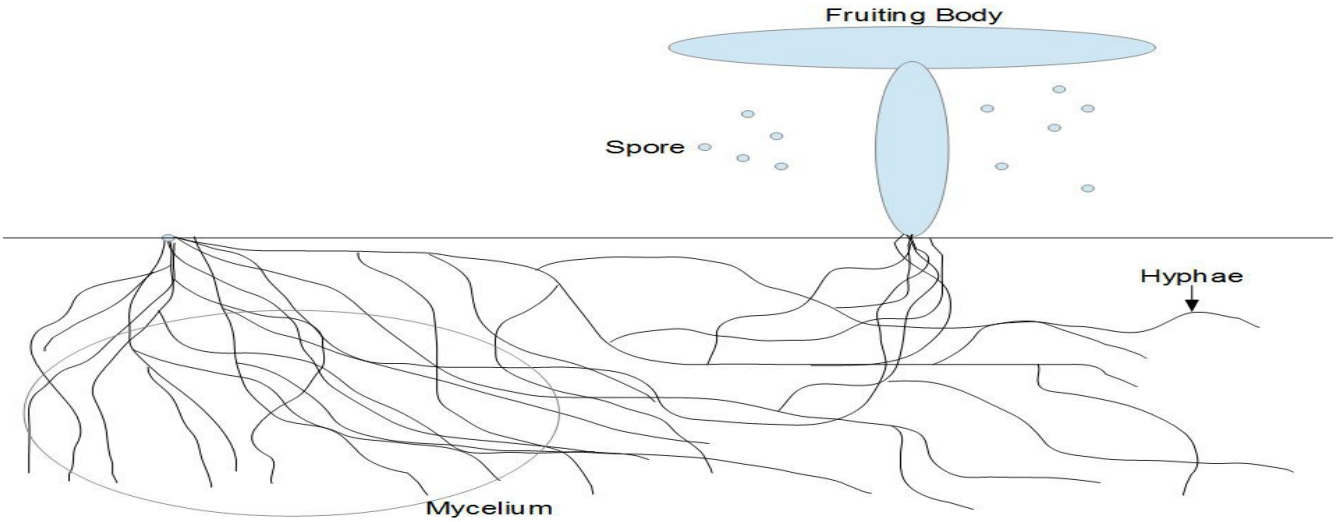
14. (4) Identify the numbered parts of the mushroom drawn below.

a. _____

b. _____

c. _____

d. _____



Taxonomy Quiz 2

Match the term on the right with its definition / example on the left. No riddle this time. (1 each)

1. _A_ Phylum of animals with stinging cells, such as Jellyfish
2. _E_ Phylum of roundworms, many of which are parasites
3. _I_ Kingdom of eukaryotic, multicellular, heterotrophic organisms
4. _H_ Would cause a plant to grow at an angle after being turned on its side
5. _J_ Reproduction without the use of seeds or spores, such as a stolon
6. _F_ Makes a plant lean toward a brightly lit window
7. _K_ Vascular tissue that transports water and minerals
8. _C_ A plant's response to touch
9. _G_ Vascular tissue that transports sugar (syrup makers tap into it)
10. _L_ A seriously strong polymer found in wood
11. _D_ Plant tissue that is not vascular or dermal
12. _B_ Kingdom of eukaryotic, multicellular, autotrophic organisms

A. Cnidaria
B. Plantae
C. Thigmotropism
D. Ground Tissue
E. Nematoda
F. Phototropism
G. Phloem
H. Gravitropism
I. Animalia
J. Vegetative Rep.
K. Xylem
L. Lignin

13. (3) Identify the plants on the screen as gymnosperm or angiosperm.

Gymnosperms have cones and naked seeds. Angiosperms have flowers and enclosed seeds.

14. (3) List a defining feature of each of the following:

A. Vascular Plant (Don't overthink. It is that easy.) __vascular tissue, e.g. xylem and phloem___

B. Angiosperm _____flowers and enclosed seeds_____

C. Gymnosperm _____cones and naked seeds_____

15. (3) List a major function of each of these plant parts:

A. Leaf ____collecting sunlight, gas exchange, photosynthesis_____

B. Stem ____supporting the plant, transmitting water nutrients and sugar___

C. Roots ____anchoring the plant, collecting water from soil, storing extra food __

Now comes the part where I give up on making this look like a quiz.

Some Vertebrate Phyla
Agnatha- jawless fishes such as Lampreys and Hagfish
Chondrichthyes- fish with cartilage skeletons, like sharks and manta rays
Reptilia- ectothermic tetrapods with a three chamber heart and eggs that can survive on land
Aves- endothermic tetrapods with feathers, toothless bills, and hard shelled eggs
Mammalia- endothermic tetrapods with a four chamber heart, mammary glands, and hair

Taxonomy 3

Match the term on the right with its definition / example on the left. No riddle this time.

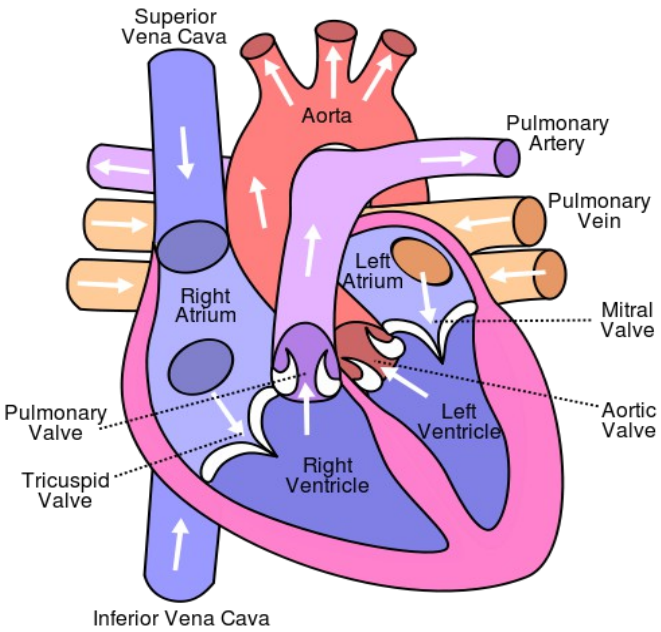
1. _E_ Phylum of segmented worms, such as leeches
2. _H_ Phylum of creatures with segmented bodies and jointed appendages
3. _K_ Makes up the exoskeleton of shrimp, lobsters, and insects
4. _A_ Phylum of creatures with a dorsal nerve cord
5. _I_ Animals that make most of their own heat
6. _B_ Subphylum of animals with a backbone
7. _C_ Section of an insect body with the legs attached
8. _D_ Animals that get most of their heat from outside their bodies
9. _L_ Cartilage that supports the dorsal nerve cord, small disks in humans
10. _F_ Body segment consisting of head and thorax merged together (spiders)
11. _G_ Insects with piercing mouth parts

A. Chordates
B. Vertebrates
C. Thorax
D. Ectotherm
E. Annelids
F. Cephalothorax
G. True Bugs
H. Arthropods
I. Endotherm
K. Chitin
L. Notochord

Human Body Systems

Circulatory System
Following a red blood cell returning to the heart from the body

Vena Cave
Right Atrium
Tricuspid Valve
Right Ventricle
Pulmonary Valve
Pulmonary Artery
Lungs
Pulmonary Vein
Left Atrium
Bicuspid (Mitral) Valve
Left Ventricle
Aortic Valve
Aorta



Wikimedia, Creative Commons 3.0

Arteries carry blood away from the heart
Veins carry blood to the heart

Pulmonary Circuit- Heart and Lungs
Systemic Circuit- Heart and whole body

Digestive System
Focusing on the enzymes, what they do, and where they do it.

Enzyme / Chemical	**Location**	**What it breaks down**
Salivary Amylase	Mouth	Starch
HCl	Stomach	Bacteria (also activates pepsin)

Pepsin	Stomach	Protein
Pancreatic Amylase	Small Intestine	Starch
Typsin	Small Intestine	Protein
Maltase	Small Intestine	Maltose
Lactase	Small Intestine	Lactose
Sucrase	Small Intestine	Sucrose
Lipase	Small Intestine	Fat
Bile Salts	Small Intestine	Fat
Peptidase	Small Intestine	Protein

Some Prime Organ Functions
Mouth- break food into smaller pieces and start chemically breaking down starch
Esophagus- carries food from the mouth to the stomach
Small Intestine- absorb nutrients with crazy large surface area
Liver- stores glycogen, produces bile
Large Intestine- absorb water and house mutualistic bacteria
Appendix- safe house for gut bacteria so they can repopulate after an illness or something like that

If your drink label just says “juice,” it has to be 100% juice. No such rule for things like “juice drinks.”

Nervous System
Central Nervous System
Brain and Spinal Cord- receive and process information
Peripheral Nervous System
All the other nerves- divided into Afferent and Efferent
Afferent Nerves
Sensory nerves, carry signals toward a central point
Efferent Nerves
Carry signals away from a central point- divided into Somatic and Autonomic
Somatic Nerves
Motor nerves- control things you do on purpose, like skeletal muscle contractions
Autonomic Nerves
Control involuntary functions like digestion and heart beat, divided into Sympathetic and Parasympathetic
Sympathetic- controls the “fight or flight” response, kicks in when scared or stressed. Increases heart rate and respiration, presses pause on digestion and the immune system.
Parasympathetic- kicks in when calm and peaceful. Heart rate and respiration slow back down. “Non essential” functions like digestion and immunity resume.
So, stay calm, stay healthy.

Hooray for complex organization! May the force be with you.