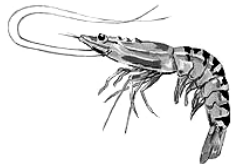


BIOLOGY 262, FALL 2004
FINAL EXAMINATION (PART 1)

Name _____ Date _____

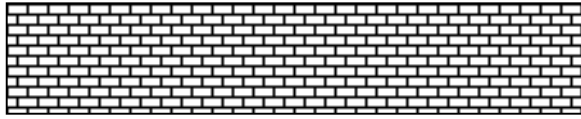
MULTIPLE CHOICE.—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (10%, 1% each)

- Which of the following is an assumption of scientific philosophy?
 - Different events cannot have the same cause.
 - Only experimental observations can prove hypotheses to be True.
 - Sense experience reflects reality.
 - The universe is disordered.
 - None of the above. (None are assumptions)
- Members of which of the following phyla have only **one** (1) digestive opening?
 - Arthropoda
 - Cnidaria
 - Mollusca
 - Nematoda
 - None of the above
- Which of the following is a correct **species** name (for the chimpanzee)?
 - Pan*
 - troglodytes*
 - Pan troglodytes*
 - pan troglodytes*
 - None of the above
- Which of the following **increases** genetic variation?
 - genetic drift
 - inbreeding
 - natural selection
 - sexual selection
 - None of the above (all decrease variation)
- Which of the following is a phylum in which the **gametophyte is dominant**?
 - Anthophyta
 - Bryophyta
 - Coniferophyta
 - Pterophyta
 - None of the above
- Which of the following organisms is **most closely related to YOU** (a human) in an evolutionary sense?
 - apple tree (flowering plant)
 - bacterium
 - fern
 - sponge
 - yeast
- Organisms in which of the following phyla includes the **roundworms**?
 - Annelida
 - Arthropoda
 - Nematoda
 - Platyhelminthes
 - None of the above
- If a population of 10,000 is undergoing **exponential growth** with a yearly intrinsic rate of increase of 0.50, then what is the size of the population after **2 years**?
 - 5,000
 - 15,000
 - 20,000
 - 22,500
 - None of the above
- If a population of 1,000 is undergoing **logistic growth** with a yearly intrinsic rate of increase of 0.50, and a carrying capacity of 2,000 then what is the size of the population after **2 years**?
 - 1000
 - 1250
 - 1500
 - 1484
 - 2250
- The central nervous system (brain & spinal cord) form from which type of tissue?
 - ectoderm
 - endoderm
 - mesoderm
 - pachyderm

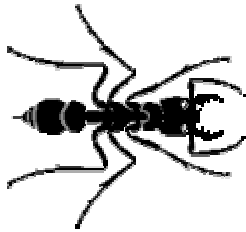


FILL-IN-THE-BLANK.—For the following exercises write the appropriate word or words in the available space. (4%)

1. Fill in the appropriate two-word label for the following epithelium. (1%)

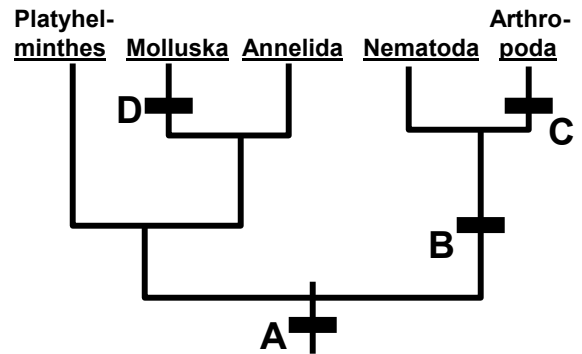


2. (1%)



Phylum- _____

3. Fill in a derived characteristic for each branch on the following phylogeny. (2%, 0.5% each)



- a. _____
 b. _____
 c. _____
 d. _____

DEFINITIONS.—For the following BIOLOGICAL words or phrases define them as accurately and concisely as possible. (11%, 2% each + 1% extra for “notochord”)

1. (behavioral) imprinting:

2. hormone:

3. neurulation:

4. notochord (Also indicate which **phylum** of animals is associated with this. = 1%):

5. smooth muscle:

BIOLOGY 262, FALL 2004
FINAL EXAMINATION (PART 2)

Name _____ Date _____

FREE RESPONSE QUESTIONS/PROBLEMS.—For the following, address each in as concise and lucid a manner as possible. Do NOT exceed the space provided. (25%)

1. (a) Explain why a gene that causes an organism to do something that results in its own death for the “good of the species” should ***not*** persist as a result of natural selection.? (3%)

(b) Explain how a gene that causes an organism to do something that results in its own death to protect its family ***may*** persist as a result of natural selection (3%)

2. (a) Explain what the human incest taboo is. (2%)

(b) Then explain why it is recognized as one of the best examples of human behavior as explained by sociobiology. (4%)

(c) Finally, explain what is revealed by the rare exceptions to the human incest taboo (e.g., the royal families of pharonic Egypt). (3%)

3. Based on your reading of *The Evolution Explosion*...

(a.) Explain what Bt toxin is and why is it called Bt (Hint: capital *B*, lower case *t*)? (1%)

(b.) Why did insect resistance to a Bt toxin that was genetically engineered into cotton evolve very rapidly whereas it took much longer for insects to evolve resistance to regularly applied Bt? (2%)

(c.) Why is Monsanto, the company that genetically engineered crops to produce Bt toxin, requiring farmers to plant “pest refuges” when using their Bt-gene modified crops? (2%)

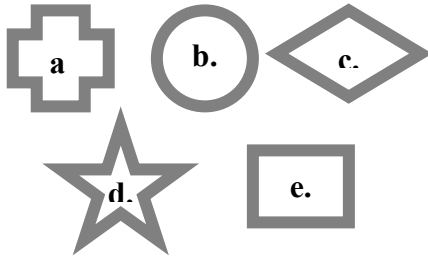
4. Explain how cells in the pancreas regulate the amount of sugar in the blood. Be certain to mention the important hormones, when these hormones are produced, and what the hormones cause to happen. (5%)

BIOLOGY 262, FALL 2004
FINAL EXAMINATION (PART 3)

Name _____ Date _____

MULTIPLE CHOICE.—For the following multiple choice questions circle the letter in front of the response that best answers the question or completes the sentence. (10%, 1% each)

1. Which of the following shapes (of equal area) is the best shape for a forest habitat fragment in which you hope to maintain the highest forest species diversity?



2. Which of the following BEST explains why one habitat fragment arrangement ↑ is better for maintaining species diversity?
- attachment to other fragments
 - dispersal and recolonization
 - edge effect
 - genetic drift
 - species maintenance
3. Which of the following best describes the community ecology relationship of a dung beetle eating cow dung (feces)?
- amensalism
 - commensalism
 - grazing
 - mutualism
 - predation
4. In a population at **Hardy-Weinberg equilibrium**, if the frequency of **AA** is **0.25**, then what is the **frequency of aa**?
- 0.25
 - 0.50
 - 0.75
 - 1.00
 - None of the above
5. In a population of 100 individuals at **Hardy-Weinberg equilibrium**, if there are **9 BB individuals**, how many **Bb individuals** should there be?
- 18
 - 42
 - 49
 - 91
 - None of the above
6. As described in *The Evolution Explosion* Flemming discovered the antibiotic penicillin by...
- conducting clinical trials of penicillin.
 - examining competition among soil bacteria.
 - inadvertently curing a skin infection when working with penicillin.
 - observing a mold inhibiting growth in a bacterium on a Petri dish.
7. Which of the following is **FALSE** about a flowering plant?
- It can produce a fruit.
 - It can produce pollen.
 - Male gametophytes grow to reach female gametophytes.
 - The embryo in the seed uses endosperm for nutrition.
 - None of the above (all are true)
8. Which of the following is the **Kingdom** to which the model organism *Saccharomyces cerevisiae* belongs?
- Alveolata
 - Animalia
 - Euglenozoa
 - Fungi
 - Stramenopila
9. In an experimental study, the group that **does not receive the treatment** is the...
- experimental group.
 - naturalistic group.
 - negative control group.
 - positive control group.
 - None of the above.
10. Which of the following is **NOT** a connective tissue?
- adipose (fat) tissue
 - blood
 - bone
 - cartilage
 - None of the above (all are connective tissues)

FILL-IN-THE-BLANK.—For the following exercises write the appropriate word or words in the available space. (6%)

Model Organism	Common Name	Kingdom	Phylum
<i>Arabidopsis thaliana</i>			
<i>Caenorhabditis elegans</i>			
<i>Drosophila melanogaster</i>			
<i>Mus musculus</i>			

2. The vertebrate class that includes the **ray-finned fishes** is the...

_____ . (1%)



DEFINITIONS.—For the following BIOLOGICAL words or phrases define them as accurately and concisely as possible. (10%, 2% each)

1. biological evolution:

2. ecological succession:

3. genetic drift:

4. natural selection:

5. pollen:

BIOLOGY 262, FALL 2004
FINAL EXAMINATION (PART 4)

Name _____ Date _____

LONG ANSWERS.— For the following answers, address each question in as concise and lucid a manner as possible. Do NOT exceed the space provided.

1. Explain how a vertebrate develops from a single cell to an embryo with a nervous system. Be certain to name each stage of development and indicate what happens developmentally at each stage. (6%)

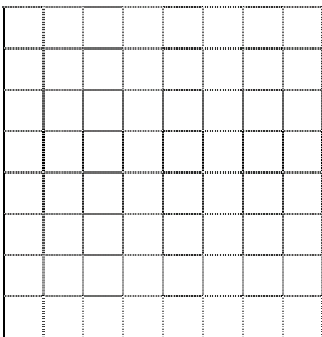
2. (a) Fill in the missing first data column in the table below. (2%) (b) Use the data below to construct a phylogenetic tree of the vertebrate species in the left column. Show the **derived traits** on your phylogenetic tree. (4%) (c) Identify **two monophyletic groups** on the phylogenetic tree you constructed by circling them. (2%)

	jaws (yes or no)	vertebrae	lungs	paired appendages
human		vertebrae	lungs	paired append.
lungfish		vertebrae	lungs	paired append.
shark		vertebrae	no lungs	paired append.
lamprey		vertebrae	no lungs	none
lancelet (outgroup)		no vertebrae	no lungs	none

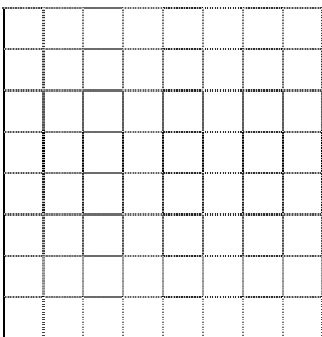
3. The following is a summary of the results of a study of removal of brown-headed cowbirds (*Molothrus ater*) from an area. Female cowbirds lay their eggs in the nests of other birds. The newly hatched cowbird chicks kill the eggs or chicks of the “host” birds and consume the food brought by the parents. This study was interested in the effects of cowbirds on abundance of other bird species. Two sites were studied in 1996. In one site cowbirds were removed. Removal was partially effective and some immigrant cowbirds were occasionally seen in the removal area. **Reported numbers are the average number of individuals of each species in the area during twelve monthly samples.** (A real study published in 2001.) (9%)

SPECIES ↓	12 mo. Average Number COWBIRDS REMOVED	12 mo. Average Number CONTROL (NO REMOVAL)	Treatment-Control Comparison P-value
red-winged blackbird	1.35	0.10	0.005
white-throated sparrow	10.50	0.80	< 0.001
Indigo bunting	7.50	0.70	0.010
hermit thrush	13.10	11.80	0.100
ovenbird	4.40	6.20	0.020

a.) Do these data support or reject the hypothesis that “*reduction in numbers of cowbirds causes a decrease in the total number of ovenbirds*”? Briefly **explain** how the hypothesis is supported or rejected and **graph** the data in a way that MOST concisely addresses the hypothesis.



b.) Do these data support or reject the hypothesis that “*reduction in numbers of cowbirds causes an increase in the total number of indigo buntings*”? Briefly **explain** how the hypothesis is supported or rejected and **graph** the data in a way that MOST concisely addresses the hypothesis.



c.) Provide a **possible explanation** for why the areas with fewer cowbirds have fewer total ovenbirds? Mention at least one direct or indirect **community interaction** that *could* cause this result?