Student Number: _____ Seat Number_____

BIO 1130FF

An Introduction to Organismal biology
Final examination
Worth 35% of your final grade

December 10, 2012

Part A: Multiple choice questions
40 points (1 point/question)

a) Fill in the bubbles for your name and student number and BIO1130FF for the course code. Fill in the same information in text in the boxes above the bubbles.

b) Use only a pencil to fill in the answer sheet. If you erase a question be sure to erase all of the pencil mark. Don't place any marks anywhere on the sheet other than where the bubbles are for personal information or your answers.

c) Do not place any answers on the question sheet.

d) This is not an open book exam.

e) A calculator is not required for this exam

f) **CAUTION to minimize paper waste this part of the exam has been printed back to back**

NOTE: If you do not fill in the student number and course code as **BIO1130FF** it will be impossible to identify your answer sheet and you will receive a **ZERO** for this part of the exam

1 The source of new alleles in a population is
a. adaptation.
b. microevolution.
c. genetic drift.
d. natural selection.
e. mutation.

2 The protostome developmental sequence arose just once in evolutionary history, resulting in two main subgroups - Lophotrochozoa and Ecdysozoa. What does this finding suggest?
a. The protostomes are a monophyletic group.
b. Division of these two groups occurred after the protostome developmental sequence appeared.
c. These two subgroups have a common ancestor that was a protostome.
d. All of the above apply.

3 A storm brings two formerly separated populations of beetles together. They look very similar. Under the biological species concept, which of the following would show that the two populations are different species?
a. One population breeds in spring, the other in fall.
b.Males of the two populations have different flight patterns in courtship.
c.When individuals from the two populations mate with each other in the laboratory, the eggs fail to hatch.
d.All of the above is correct.
e.None of the above is correct.

4 Two species of frogs belonging to the same genus occasionally mate, but the offspring fail to develop and hatch. What is the mechanism for keeping the two frog species separate?
a. the postzygotic barrier called hybrid inviability
b. the prezygotic barrier called hybrid sterility
c. the postzygotic barrier called hybrid breakdown
d. gametic isolation
e. adaptation

5 About which of these did Darwin have a poor understanding?
a. the factors that cause individuals in populations to struggle for survival
b. the sources of genetic variations among individuals
c. how a beneficial trait becomes more common in a population over the course of generations
d. that individuals in a population exhibit a good deal of variation
e. that much of the variation between individuals in a population is inherited

6 Which of the following do all fungi have in common?
a. meiosis in basidia
b. absorption of nutrients
c. coenocytic hyphae
d. symbioses with algae
e. sexual life cycle

7 The Hardy-Weinberg principle of genetic equilibrium tells us what to expect when a sexually reproducing population is
a. evolving.
b. decreasing with each generation.
c. increasing with each generation.
d. not evolving.
e. migrating.

8 Birds are living representatives of which of the following lineages?
a. archosaurs
b. synapsids
c. lepidosaurs
d. anapsids

9 Which of these time intervals, based on plant fossils, came last (most recently)?
a. rise and diversification of angiosperms
b. carboniferous swamps with giant horsetails and lycophytes
c. extensive growth of gymnosperm forests
d. colonization of land by early liverworts and mosses
e. Silurian-Devonian explosion with fossils of plant lineages that contain most of the major morphological innovations

10 Cladograms (a type of phylogenetic tree) constructed from evidence from molecular systematics are based on similarities in
a. biochemical pathways.
b. habitat and lifestyle choices.
c. mutations to homologous genes.
d. the pattern of embryologic

11 A rapid method of speciation that has been important in the history of flowering plants is
a.genetic drift.
b. behavioral isolation.
c. a mutation in the gene controlling the timing of flowering.
d. polyploidy.

12 The substance that typically provides rigidity to fungal cell walls is
a. cellulose.
b. lignin.
c. starch.
d. chitin.

13 Fungi are most closely related to which of these groups?
a. red algae
b. animals
c. green algae
d. plants

14 Natural selection results in
a. stabilizing selection.
b. adaptation.
c. genetic drift.
d. a new species.
e. a mutation.

15 Mammals and birds eat more often than reptiles. Which of the following traits shared by mammals and birds best explains this habit?
a. insulating body cover
b. terrestrial
c. ectothermy (cold blooded)
d. have a notochord
e. endothermy (warm blooded)

16 Heterospory refers to having
a. two spore types.
b. male and female gametes.
c. separate male and female plants.
d. both sporophyte and gametophyte generations.
e. both male and female parts on the same plant.

17 Why have biologists hypothesized that the first land plants had a low, sprawling growth habit?
a. Land animals of that period were small so they needed short plants to eat.
b. At the time of the first land plants, the atmosphere had oxygen mainly close to the ground.
c. Land animals of that period consumed erect plants.
d. Only fossilized plants exhibit this habit.
e. The ancestors of land plants, green algae, lack the structural support to stand erect in air.

18 Cattle breeders have improved the quality of meat over the years by which process?
a. artificial selection
b. directional selection
c. stabilizing selection
d. artificial selection and directional selection
e. artificial selection and stabilizing selection

19 How did the development of the jaw contribute to evolutionary diversification of early vertebrate lineages?
a. It allowed for more modes of communication.
b. It allowed vertebrates to feed on a wider variety of food sources.
c. It provided for an appreciation of a wider variety of foods.
d. It increased their mobility.
e. It allowed vertebrates to grow a bony skull.

20 The ____ is a protective structure where egg cells are formed in mosses and some other plants.
a. antheridium
b. sporangium
c. stoma
d. archegonium
e. strobilus

21 Which of the following best describes fertilization in the fern life cycle?
a. Pollen is blown by the wind to a female cone, where it forms a pollen tube that grows toward where the egg will form.
b. Flagellated sperm are blown by the wind to a location near an egg, then swim through plant fluids to reach the egg.
c. Flagellated sperm swim in a film of water on the surface of the plant to reach an egg.
d. Flagellated sperm swim through plant fluids to reach an egg.

22 The morphological species concept would relate more to
a. postzygotic isolation.
b. prezygotic isolation.
c. neither prezygotic nor postzygotic isolation.
d. it would depend on the species used for the study.

23 Which of the following would be useful in creating a phylogenetic tree of a taxon?
a. Genetic sequences from living species
b. Morphological data from fossil species
c. Behavioral data from living species
d. All of the above
e. None of the above

24 In pine trees the megaspores develop within a(n)
a. seed.
b. ovule.
c. strobilus.
d. sporopollenin.

25 Birds are
a. Synapsids
b. Diapsids
c. Anapsids
d. Aviapsids

26 Which of the following statements explains why animals are less likely than plants to speciate by polyploidy?
a. Animals are more mobile, so populations get separated far less often.
b. Animals self-fertilize less often than plants, so diploid gametes are less likely to fuse.
c. Animals are better at recognizing appropriate mates.
d. Animals have better mechanisms for repairing chromosomes than plants have.

27 The two major goals of systematic biology are to analyze _____ , which tells an evolutionary history and to perform _____ , which classifies each species.
a. phylogeny; taxonomy
b. taxonomy; phylogeny
c. phylogeny; systematic
d. trees; phylogeny

28 Which type of evolutionary phenomenon can best be summed up with the phrase "Same problems lead to similar solutions?"
a. gene flow
b. divergence
c. natural selection
d. convergence

29 You are maintaining a small population of fruit flies in the laboratory by transferring the flies to a new culture bottle after each generation. After several generations, you notice that the viability of the flies has decreased greatly. Recognizing that small population size is likely to be linked to decreased viability, the best way to reverse this trend is to
a. cross your flies with flies from another lab.
b. transfer only the largest flies.
c. reduce the number of flies that you transfer at each generation.
d. shock the flies with a brief treatment of heat or cold to make them more hardy.
e. change the temperature at which you rear the flies.

30 Which evolutionary innovation was most significant in helping tetrapods move to dry terrestrial environments?
a. the amniotic egg
b. the lung
c. endothermy
d. bone
e. limb specialization

31. The perforated pharynx of chordates evolved as a device for
a. Support
b. Respiration
c. Filter-feeding
d. All of the above

32 Terrestrial vertebrates made their appearance approximately 400 million years ago, near the end of the _____ period.
a. Permian
b. Ordovician
c. Devonian
d. Cambrian
e. Triassic

33 Frogs, toads, and salamanders belong to the vertebrate class
a. Aves.
b. Reptilia.
c. Mammalia.
d. Amphibia.
e. Chondrichthyes.

34 Fishes regulate buoyancy by precisely regulating the volume of gas in the
a. stomach.
b. gills.
c. body tissues.
d. pyloric cecum.
e. swim bladder.

35 _____ is a series of abrupt structural, physiological, and behavioral changes that transform a larva into an adult.
a. Regeneration
b. Neoteny
c. Metamorphosis
d. Amplexus
e. Parthenogeny

36 The class Reptilia is considered to be ____ because the group contains species that share a common ancestor, but does not include all of that ancestor's descendants.
a. a mosaic
b. polyphyletic
c. paraphyletic
d. an outgroup

37 In insects that display _____ metamorphosis, the primary difference between adults and larvae are wings and degree of sexual development.
a. paurometabolous
b. hemimetabolous
c. ametabolous
d. holometabolous
e. amphimetabolous

38 Which adaptation is unique to insects among all protostomes?
a. the ability to move via jointed limbs
b. the ability to parasitize other organisms
c. the ability to move by flying
d. the ability to consume terrestrial plants
e. the ability to metamorphose

39 Insect dominance of the terrestrial environment is probably due to the evolution of
a. flight.
b. cephalization.
c. the exoskeleton.
d. metamerism.
e. jointed appendages.

40 Which of the following is an example of homoplasy?
a. Cell walls in plants and fungi
b. Chlorophyll in flowering plants and algae
c. Scales in snakes and lizards
d. Fur in bears and seals

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Total points for both parts of the exam is 110 pts

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Part B: Written questions

a) Place your name and student number in the space provided below. Be sure only your student number, is on the top of each of the following pages – the exam will be separated and if you name is not on a page your mark will be zero for that page. This part of the exam is worth 65 points.

b) Answer all questions in the space provided on the exam. Do not transfer answers to the back of the page.

c) You may use either pencil of ink for your answers.

d) Answers as written paragraphs are preferred but point form is acceptable as long as the points are logically organized and not random statements or facts

e) This is not an open book exam.

f) A calculator is not required for the exam

g) There are seven pages including this one in part B of the exam, be sure you have all seven pages

Name: _____

Student number: _____

18 pts Part 1. Briefly explain what each of the following terms means or the biological contribution made by the person. Where possible include an example in your explanation from a group or an organism to which the term or name applies.

Mass extinction

Plasmogamy

Epicuticle

Flood Basalt

Ediacaran fossils

Gamatangia

Anything written below this line will not be marked.

29 pts Part 2: Fill in the missing word, or provide the one word answer in the space provided at the end of the sentence. If the line is missing, add it.

2.1 Genetic drift isn't as likely in this size of a populations. _____

2.2 Mosses and many of these similar plants live in moist environments because their cuticle doesn't have this property. _____

2.3 Number of mass extinctions like the one at the end of the Ordovician that have happened.. _____

2.4 The type of animal most commonly used by flowering plants for pollination. _____

2.5 The feeding strategy of fungi. _____

2.6 This type of reptile skull had one opening in the skull to accommodate the jaw muscles. _____

2.7 Terrestrial plants evolved from this type of algae. _____

2.8 This type of body symmetry in animals may be linked to changes in the homeotic genes at the time of the Cambrian explosion. _____

2.9 These valves or openings in the body wall of an insect, connect with the tubes that carry air to the inside of the animal. _____

2.10 The developing sporophyte develops after this type of cell division by the fertilized zygote. _____

2.11 This type of geothermal discharge was probably the source of the greenhouse gases the melted the frozen planet earth prior to the Cambrian. _____

2.12 An increase in this mineral in the Cambrian oceans may explain the sudden appearance of the shelly animals in the fossils of the Cambrian. _____

2.13 Number of nuclei in the female gametophyte of a flowering plant. _____

2.14 Although there is increasing evidence to the contrary it is still generally believed that this form of animal appears at the start of the Cambrian period. _____

2.15 Some species of plants grow at the top of the hill others at the bottom. It's an example of this type of isolating mechanism. _____

2.16 Different species of frogs sing their mating songs at different times of the day. It's an example of this type of isolating mechanism. _____

2.17 Do fungi have swimming gametes? _____

2.18 The base of the feather that emerges from the follicle that forms it. _____

2.19 This structure contains the microsporangia of flowering plants. _____

2.20 This part of the range of variation is selected against in disruptive selection. _____

2.21 Mosses are an example of this type of plant architecture. _____

2.22 One of the consequences of not having any mesoderm is that you don't have these either. _____

2.23 The protostomes may be actually two different taxa. One is the Lophotrochozoa, the other is this. _____

2.24 A mass of photosynthetic plant cells. _____

2.25 In nonvascular plants these special cups can assist in getting water soaked sperm to the egg. _____

2.26 Alternate forms that a gene can take. _____

2.27 In conifers (gymnosperms) pollen is dispersed using this. _____

2.28 The Cambrian fauna were the first to do this tapped into a food resource on the oceans bottom that no one had been able to use. _____

2.29 The only living group of vertebrates without an opening in the skull to accommodate the jaw muscles. _____

Part three of the exam is on the next page

18 pts Part 3: Answer the following three questions in the space provided.

6 pts 3.1 What is the difference between allopatric and sympatric speciation. Give an example of each.

6 pts 3.2 Both plants and animals have to protect their body surfaces from water loss in the terrestrial environment. Use a plant, an invertebrate and vertebrate animal to explain how this is done.

6 pts 3.3The biological and phylogenetic species concepts have advantages and disadvantages. What are each of these concepts based on and give an advantage and disadvantage for each of the concepts.

Anything written below this line will not be marked.