Student Number: _____ Seat Number_____

BIO 1130FF

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

December 13, 2011

Part A: Multiple choice questions
45 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 definition of allopolyploidy is
    a. a genetic divergence that results in nonviable offspring.
    b. an increase in chromosome number within a single species.
    c. an increase in chromosome number due to hybridization of different species.
    d. a decrease in chromosome number within a single species.

2. Reptiles were a paraphyletic group because
    a. They do not have a common ancestor.
    b. They have a common ancestor.
    c. They do not include all the descendants of the common ancestor.
    d. They include all the descendants of the common ancestor.

3. This simple plant body structure of a flat, branching, ribbonlike plate of tissue closely pressed against damp soil is commonly found as the gametophyte generation for many liverworts.
    a. antheridium
    b. thallus
    c. gemma
    d. archegonium
    e. rhizoid

4. For humans and most vertebrates the body is supported primarily by
    a. an endoskeleton.
    b. joined exo- and endoskeletons.
    c. an exoskeleton.
    d. a hydrostatic skeleton

5. Gene flow between organisms of ring species occurs
    a. only under laboratory conditions.
    b. never.
    c. between any of the organisms if they are placed in the same environment.
    d. only between adjacent populations.

6. All fungi can reproduce via
    a. spores.
    b. asci.
    c. conidia.
    d. fruiting bodies.

7. The Darwinian fitness of an individual is measured most directly by
    a. how long it lives.
    b. the number of "good genes" it possesses.
    c. the number of its offspring that survive to reproduce.
    d. the number of mates it attracts.
    e. its physical strength.

8. Birds and mammals are considered polyphyletic when considering that
   a. birds have wings and mammals do not.
   b. birds and mammals do not share the same common reptilian ancestor.
   c. molecular clock data indicates birds and mammals diverged at the same time.
   d. birds and mammals cannot interbreed.

9. The difference in the appearance of the male and the female of the same species is called
   a. sexual selection.
   b. polymorphism.
   c. a primary sexual characteristic.
   d. sexual dimorphism.
   e. the dioecious condition.

10. Natural selection is most nearly the same as
   a. diploidy.
   b. genetic drift.
   c. gene flow.
   d. non-random mating.
   e. differential reproductive success.

11. According to the fossil record, plants colonized terrestrial habitats _____.
   a. in conjunction with insects that pollinated them.
   b. in conjunction fungi that helped provide them with nutrients from the soil.
   c. from marine habitats.
   d. only about 150 million years ago.

12. A designation that applies to all vertebrates except fishes is _____ (adaptations to life on land are found in some members of any group of this designation).
   a. tetrapod
   b. gnathostome
   c. apod
   d. agnatha
   e. amniote

13. Chitin-lined tubules that deliver air directly to body tissues in many terrestrial arthropods are called
   a. lamellae.
   b. alveolar lungs.
   c. tracheae.
   d. book lungs.
   e. Malpighian tubules.

14. Which of the following is found in tetrapods and not in fish?
   a. asexual reproduction
   b. internal fertilization
   c. viviparity
   d. extensive parental care
   e. production of amniotic eggs

15. Which of the following types of diversity within a population is/are subject to evolutionary change?
    a. variation in plant colour due to soil acidity
    b. variation in muscle mass due to exercise
    c. variation in skin colour due to sun exposure
    d. variation in blood type

16. Which of these is the smallest unit upon which natural selection directly acts?
    a. a population's gene frequency
    b. an individual's genome
    c. an individual's genotype
    d. an individual's phenotype
    e. a species' gene frequency

17. Which of the following is a typical source of nutrients and water for developing amniote embryos?
    a. albumin
    b. collagen
    c. bone
    d. squalene

18. Reptiles of this lineage had upper and lower openings in the temporal region of the skull.
    a. diapsid
    b. amphiapsid
    c. anapsid
    d. synapsid
    e. triapsid

19. The slender, rootlike structures found in nonvascular plants are called ____.
    a. rhizomes
    b. gametangia
    c. thalli
    d. rhizoids
    e. protonemata

20. Among insects with _____ metamorphosis, immatures are called larvae because they are very different from the adult in body form, behavior, and habitat. a. ametabolous
    b. holometabolous
    c. paurometabolous
    d. hemimetabolous
    e. chrysalous

21. Which of the following will disrupt Hardy-Weinberg equilibrium the least?
    a. nonrandom mating
    b. stabilizing selection
    c. migration
    d. reduction to a small population size
    e. directional selection

22. 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.

23. The main benefit to a plant from a mycorrhizal association is
    a. enhanced water uptake.
    b. removal of excess carbohydrates.
    c. enhanced mineral ion uptake.
    d. enhanced flow of carbohydrates to the roots.

24. The phenomenon of fusion is likely to occur when, after a period of geographic isolation, two populations meet again and
    a. the hybrid zone is inhospitable to hybrid survival.
    b. their chromosomes are no longer homologous enough to permit meiosis.
    c. a constant number of viable, fertile hybrids is produced over the course of generations.
    d. a decreasing number of viable, fertile hybrids is produced over the course of generations.
    e. an increasing number of viable, fertile hybrids is produced over the course of generations.

25. Toxic secretions in amphibians are frequently accompanied by
    a. warning coloration.
    b. warts and claws.
    d. mimicry
    e. cryptobiosis.

26. In order for speciation to occur, what is true?
    a. The number of chromosomes in the genome must change.
    b. At least one gene, affecting at least one phenotypic trait, must change.
    c. Changes to centromere location or chromosome size must occur within the genome.
    d. Large numbers of genes that affect numerous phenotypic traits must change.
    e. Large numbers of genes that affect a single phenotypic trait must change.

27. Naming procedures for animals are standardized according to
    a. Linnaeus' Systema Nuturae
    b. Aristotle's Scala Naturae
    c. The Linnaean system of binomial nomenclature
    d. the International code of zoological nomenclature

28. How are two different species most likely to evolve from one ancestral species?
    a. phylogenetically, due to heterozygote advantage in hybrids
    b. sympatrically, by a point mutation affecting morphology or behavior
    c. allopatrically, after the ancestral species has split into two populations

29. Molecular phylogenies show all land plants are a monophyletic group. This suggests that _____.
    a. land plants have undergone a diversification since they first colonized terrestrial habitats.
    b. there was a single transition from aquatic to terrestrial habitats.
    c. wind-pollinated plants arose first.
    d. there were many different transitions from aquatic to terrestrial habitats.

30. Four of the five population attributes can be calculated with the Hardy-Weinberg equation. Select the EXCEPTION.
    a. the frequency of a dominant allele
    b. the frequency of homozygous dominant genotypes
    c. the frequency of mutation
    d. the frequency of heterozygotes
    e. the frequency of a recessive allele

31. What is the name of the part of a plant that consists of self-perpetuating embryonic tissue typically found at the tips of shoots and roots?
    a. dermal tissue
    b. meristem
    c. ground tissue
    d. protoderm

32. Predatory lifestyles in gnathostomes were possible because of the development of
    a. Jaws
    b. A closed circulatory system
    c. Paired fins
    d. Bony armour

33. Spores and seeds have basically the same function - dispersal - but are vastly different because
    a. spores depend primarily on animals for dispersal; seeds do not.
    b. spores are unicellular; seeds are not.
    c. spores have stored nutrition; seeds do not.
    d. spores have a protective outer covering; seeds do not.
    e. spores have an embryo; seeds do not.

34. In the Hardy-Weinberg equation "2pq" represents
    a. the total pool of alleles for the dominant phenotypes.
    b. the homozygous recessive genotypes.
    c. the heterozygous genotypes.
    d. the homozygous dominant genotypes.

35. Reduction in competition between adult and larval arthropods is accomplished by
    a. asexual reproduction.
    b. regeneration.
    c. metamorphosis.
    d. ecdysis.
    e. parthenogenesis.

36. The development of limbs probably helped the first amphibians in
    a. Finding mates
    b. Running on land
    c. Swimming
    d. Moving between bodies of water

37. An important fossil fuel is coal, much of which was formed when
    a. northern-latitude bogs accumulated peat.
    b. huge gymnosperms were flooded by an inland sea.
    c. extensive forests of seedless vascular plants were buried and compressed.
    d. ancient angiosperms got buried under volcanic ash.
    e. All of these answers apply.

38. What was the species concept most used by Linnaeus?
    a. morphological
    b. biological
    c. phylogenetic
    d. ecological

39. Although there are fewer than 14,000 living species of seedless vascular plants, they were the dominant plants on Earth for nearly 200 million years. Their dominance ended at the end of the Carboniferous period, about
    a. 420 million years ago.
    b. 125 million years ago.
    c. 1.5 billion years ago.
    d. 250 million years ago.
    e. 17 million years ago.

40. To the nearest 500,000 the estimated number of species on the planet.
    a. 1.3 million
    b. 8.5 million
    c. 0.9 million
    d. 13 million
    e. 87 million

41. What group of mammals have (a) embryos that spend more time feeding through the placenta than the mother's nipples, (b) young that feed on milk, and (c) a prolonged period of maternal care after leaving the placenta?
    a. Monotremata
    b. Marsupiala
    c. Eutheria
    d. all of the above

42. How do mass extinctions differ from background extinctions?
    a. Mass extinctions account for most species that have gone extinct in the history of life on Earth.
    b. Mass extinctions involve a relatively rapid extinction of a large proportion of organisms that were alive at that time.
    c. It is now recognized that mass extinctions but not background extinctions are generally caused by asteroid impacts.

43. Which of the following best describes fertilization in the moss 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 swim in water to reach an egg.
    c. Flagellated sperm swim through plant fluids to reach an egg.
    d. Flagellated sperm are blown by the wind to a location near an egg, then swim through plant fluids to reach the egg.

44. 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

45. 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.

BIO 1130 An Introduction to Organismal biology
Final examination
Worth 35% of your final grade
Total points for both parts of the exam is 110 pts

December 13, 2011
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.

Endosperm

Vicariance

Swim bladder

Folk Taxonomies

Out group

Secondary plant cell wall

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 In some genetic crosses (RR x rr) the ratio of visible traits is 1:2:1 in the F1 generation with two seemingly intermediate conditions. It's an example of this type of dominance. _____

2.2 Muscles are formed from this embryonic tissue. _____

2.3 A term for egg-laying animals. _____

2.4 The presence of fore and hind limbs identifies amphibians and all the vertebrates to follow as this group of animals. _____

2.5 The visible expression of the underlying genetic make up of an organism. _____

2.6 What were the first vascular plants were reaching up for. _____

2.7 Heavy selection pressure on a population will cause one allele to become this. _____

2.8 The most anterior pair of fins on the side of a shark are these fins. _____

2.9 The general name for both the male and female reproductive structures in plants. _____

2.10 Mammalian taxonomists spend a lot of time looking at mammal jaws and these when dividing the class into different taxa. _____

2.11 Type of mutation where a single nucleotide change codes for the stop codon. _____

2.12 A group of individuals from the same species. _____

2.13 Flying mammals. _____

2.14 This multicellular part of the plant life cycle produces gametes. _____

2.15 If both extremes of variation are not favorable then this type of selection occurs. _____

2.16 Chromosome compliment of hyphae before plasmogamy occurs. _____

2.17 Different species of fireflies have unique flash sequences for the light they use to attract a mate. It's an example of this type of isolation mechanism. _____

2.18 This gas is the source of almost all the biomass of a plant (Two words) _____

2.19 This sugar reward in flowering plants is a gift to their pollinators. _____

2.20 In addition to a nutrient supply the seed also contains this critical stage in a flowering plants life cycle. _____

2.21 A strand of fungal cells aligned end to end. _____

2.22 The chromosome compliment of the gametophyte. _____

2.23 Birds and insects both fly and have wings, but they don't share a common ancestor so their wings are considered as being this type of character. _____

2.24 Cladistics uses these characters to unravel the evolutionary relationships between different groups of organisms (one word ONLY). _____

2.25 An immature larval amphibian. _____

2.26 Horses and zebras can mate but their offspring can't produce young. It's an example of this type of isolating mechanism (Two words) _____

2.27 Even though pollen (male gamete) from a variety of different plant species land on the stigma (female) only those of the same species will ultimately fertilize the ovule (egg). It's an example of this type of isolation mechanism. _____

2.28 Synonym for evolutionary taxonomy. _____

2.29 If you have a set of rules for how you will classify different things then you've got this. _____

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 Bottle neck and founder effects have some similarities and distinct differences between them. What are Bottle neck and founder effects, the similarities and differences between the two and their microevolutionary impact?

6 pts 3.2 Waxes combined with valve that open and close to control air intact are common solutions to the loss of water in insects and plants. Explain how the valves and waxes are used in insects and plants.

6 pts 3.3 The 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.