BIO 1130FF

An introduction to Organismal biology
Midterm examination
Worth either 15% or 20% of your final grade

Saturday, October 4, 2014

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

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.

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.

Do not place any answers on the question sheet.

This is not an open book exam.

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

FF.1 Which of these evolutionary agents is most consistent at causing populations to become better suited to their environments over the course of generations?
a. Mutation
b. Natural selection
c. Non-random mating
d. Gene flow
e. Genetic drift

FF.2 The fossil *Archeopteryx* is an important transitional fossil because it demonstrates which of the following environmental transitions.
a. Marine to terrestrial
b. Freshwater to terrestrial
c. Terrestrial to freshwater
d. Terrestrial to air
e. Terrestrial to marine

FF.3 Which of the following statements best summarizes evolution as it is viewed today?
a. It is the descent of humans from the present-day great apes.
b. It is synonymous with the process of gene flow.
c. It represents the result of selection for acquired characteristics.
d. It is the differential survival and reproduction of the most-fit phenotypes.
e. It is goal-directed.

FF.4 Four of the five processes below are components of natural selection. Select the EXCEPTION.
a. genetic drift
b. genetic variation
c. limitations in vital resources
d. differential reproductive success
e. overproduction of offspring

FF.5 Which of the following ideas, important to the development of evolutionary theory, was suggested by Charles Lyell?
a. The earth is at least millions, not thousands, of years old.
b. Species produce many more offspring than can survive.
c. Organisms can be classified into groups based on their morphological characteristics.
d. Food and other resources are limited for most populations.

FF.6 If the diploid number of chromosomes of a plant species is 32, how many chromosomes would one expect to find in an autoploid gamete produced by that plant?
a. 0
b. 16
c. 32
d. 64

FF.7 The scientific discipline concerned with naming organisms is called
a. phylocode
b. taxonomy.
c. cladistics.
d. systematics.
e. binomial nomenclature

FF.8 Directional selection favours
a. intermediate phenotypes.
b. phenotypic extremes at both ends.
c. phenotypes at one end of the distribution.
d. homozygotes.
e. heterozygotes.

FF.9 Charles Darwin made his most important observations that later led him to develop the theory of evolution _____.
a. as a student studying at Cambridge University
b. as a young naturalist working in the Asian tropics
c. on a voyage on the surveying ship Beagle that sailed around the world
d. after viewing collections of specimens at various museums in Europe

FF.10 Molecular phylogenies are constructed with data from sequences of
a. DNA and RNA.
b. proteins.
c. amino acids.
d. a and b.

FF.11 Early scientists studying biogeography noticed that _____.
a. there is a limited, easily documented number of species found in similar habitats around the world
b. different species with similar forms occupy similar habitats on different continents
c. identical species occupy similar habitats around the world
d. most species are widely distributed around the world

FF.12 When Darwin visited the Galápagos Islands, he discovered that tortoise and finch species on different islands are _____.
a. identical, but completely unrelated to those on the mainland
b. unrelated
c. identical to each other, and related to those on the mainland
d. slightly different but closely related, and also related to those on the mainland

FF.13 Sexual dimorphism is most often a result of
a. intersexual selection.
b. artificial selection.
c. pansexual selection.
d. intrasexual selection.
e. stabilizing selection.

FF.14 Each of the following has a better chance of influencing gene frequencies in small populations than in large populations, but which one most consistently requires a small population as a precondition for its occurrence?
a. Mutation
b. Natural selection
c. Non-random mating
d. Genetic drift
e. Gene flow

FF.15 Darwin changed the way we think about variation and its influence on biodiversity by natural selection. This new type of thinking was termed:
a. essentialist thinking
b. finalist thinking
c. population thinking
d. transformation thinking

FF.16 Which of the following could be an example of allopolyploidy?
a. One parent has 32 chromosomes, the other has 10, and their offspring have 42.
b. Gametes and somatic cells have the same number of chromosomes.
c. Chromosome number increases by one in a gamete and in the oflspring it produces.
d. Chromosome number in the offspring is exactly half of what it is in the parents.

FF.17 Which of these theories did Georges Cuvier hold to be true, with regards to species change?
a. gradualism
b. catastrophism (catastrophy theory)
c. evolution
d. geological time

FF.18 Darwin's theory of evolution was unique for all of the following reasons except _____.
a. Darwin provided physical rather than spiritual explanations for the origins of biological diversity
b. Darwin provided a mechanism by which individuals could adapt as their environment changed
c. Darwin described evolution as a multistage process
d. Darwin understood that evolution occurs because some organisms function better than others in a particular environment

FF.19 Which of the following conditions is not one of those under which a population of diploid organisms will achieve genetic equilibrium?
a. the mutation rate is increasing
b. no immigration from other populations
c. the population is infinite in size
d. individuals mate randomly

FF.20 A population of mice is at Hardy-Weinberg equilibrium at a gene locus that controls fur colour. The locus has two alleles, M and m. A genetic analysis of the population reveals that 60% of its gametes carry the M allele. What percentage of mice contain both the M and m alleles?
a. 16%
b. 36%
c. 48%
d. 64%

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Part B: Written questions

a) Place your name and student number in the space provided below. Be sure that your student number is on the top of each of the following pages – the exam will be separated. ONLY place your student number on the pages where indicated

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

g) Enter the multiple choice exam code in the space provided

Name: _____

Student number: _____

Multiple Choice Exam Code (MM or FF): _____

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12 pts Part 1. Briefly explain what each of the following terms or phrases 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.

Convergent evolution

Primary scientific literature

Environmental transformation (Essentialist)

Hypothesis

18 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 to the end of the line.

2.1 In Mendelian genetics the P generation. _____

2.2 The fibre optic cable allowed transmission of data quickly over long distance and Douglas Adams felt it defined this age of scientific discovery. _____

2.3 Of the two types of sciences prior to 1930 those that believed that living things behaved according to the laws of physics and chemistry but has a special essence that made them living. _____

2.4 As a young biologist you are asked to organize some never before seen animals. Some you can match to known ones but there is a very different group in the set and all of them have a radial symmetry but unlike the jelly fish no cnidocytes. You propose a new group of animals and name them the cubozoa because of their box like shape and their dissimilarity with the jellyfish. This is what type of reasoning? _____

2.5 When organisms from another population start to breed with a second population this occurs. (Two words) _____

2.6 This is the preferred investigative method of the physical sciences. _____

2.7 Type of mutation where there is an addition of single nucleotide in the sequence. _____

2.8 While Europe is plunged into the dark ages the Muslim word entered into this age (or era) of discovery. _____

2.9 Most point mutations are of this type. _____

2.10 The Muslim scholar Avicenna combined the known medical knowledge of the Greek and Muslim world with this third great civilization. _____

2.11 Number of Kingdoms in Linnaeus' classification. _____

2.12 This type of genetic drift occurs when a population is reduced to only a few survivors that remain in their original habitat. (Two words) _____

2.13 Taxon above a family but below a class. _____

2.14 In this type of review other scientists working in the same area as you look over your manuscript and make recommendation on whether it should be published. _____

2.15 The type of reason used by the natural sciences works from the specific and tries to find generalized patterns. _____

2.16 The medieval ages came to an end at the start of this century_____

2.17 The validity of historical narrative was ignored as a result of the scientific revolution until the mid 1800's. This scientist revalidated the narrative as a true and sound scientific method. _____

2.18 If a major scientific finding is applicable throughout the universe it reaches this level, unfortunately biological facts will never reach this level if universality is the sole criteria. _____

Part three of the exam is on the next page

10 pts Part 3: Answer the following two questions in the space provided.

3.1 How does mild and strong selection affect the genetic variability of a population? Give an example

3.2 Scientists in the 18th and very early 19th century challenged the *Scala naturae*. Choose two scientists and briefly describe the evidence that challenged the long held belief.