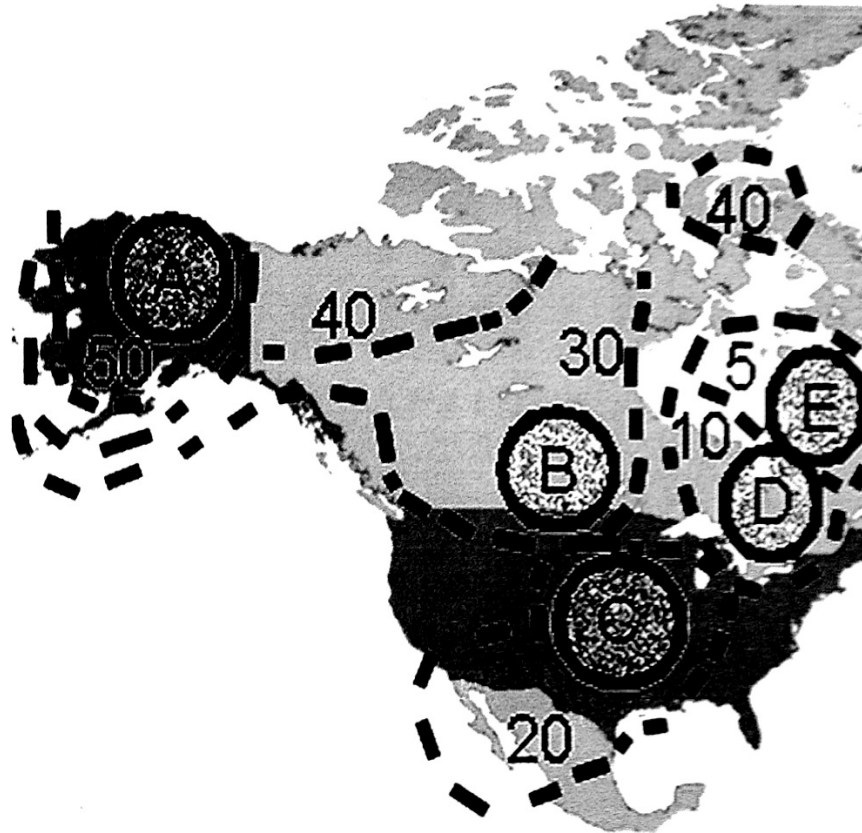


Evidence for Evolution

Base your answers to questions 1 through 3 on the map below of the distribution of several populations on the continent of North America. These populations were derived from a common ancestral species. The area enclosed by a given dashed line represents the distribution of the population and the numbers in millions of years refer to the earliest fossil evidence found within the bounded area. Populations which are present today are found only in lettered circles.



- ___ 1. The youngest existing population is found at
A) A B) B C) C D) D E) E
- ___ 2. The two existing populations that are the most closely related are
A) B and C B) A and B C) A and D D) D and E E) C and E
- ___ 3. What conclusion about the area occupied by the original species can be made by studying the map?
A) It increased at a constant rate. C) It decreased at a constant rate.
B) It increased and then decreased. D) It remained stable over time.
E) It decreased and then increased.

- ___ 4. The marsupial Australian sugar glider and the placental North American flying squirrel possess examples of
A) analogous structures D) neutral selection
B) divergent evolution E) sympatric speciation
C) homologous structures

- ___ 5. Which of the following discoveries is least likely?
A) A fossil of a clam
B) A fossil of a soft-bodied worm
C) A fossil of a human skeleton
D) A fossil of a plant in the mud
E) A fossil of a bug

Evidence for Evolution

Base your answers to questions 6 through 8 on the diagram below.



6. Recently exposed sedimentary rock in region D contains fossilized organisms that closely resemble fossils in regions A and B. The fossils found in region D are older than those in region B but are younger than those in region A. From this, it can be concluded that
- A) Historical climactic events forced massive emigration of the fossilized species from region A to region D.
 - B) Organisms of this species emigrated from region C, reaching region A before region D.
 - C) Region A separated from regions B and D before they separated from each other.
 - D) Region E served as a land bridge between regions B and D.
 - E) The species evolved separately in regions A, B and D.
7. Though species from regions A and B evolved from the ancestral species whose fossils were found in region D, the species from A and B are no longer physiologically identical to the ancestral species from D. The best explanation for this is
- A) biogeographical influence on natural selection
 - B) lack of limiting factors in each environment
 - C) mutation rate in different environments
 - D) similar food sources
 - E) sympatric speciation
8. Physical similarities between organisms in regions B and E provide evidence for
- A) convergent evolution
 - B) homologous structures
 - C) neutral selection
 - D) ontogeny
 - E) stabilizing selection
-
9. According to biogeography, species tend to be more closely related to
- A) other species from the same area
 - B) other species with the same lifestyle, but different location
 - C) other species with similar features, living in a different location
 - D) other species that reproduce similarly, but live in a different location
 - E) other species with similar environmental pressures living in a different location
10. Carbon-14 has a half-life of 5600 years. It would be appropriate to use carbon-14 in dating a sample that is
- A) 1 year old.
 - B) 10,000 years old.
 - C) 100,000 years old.
 - D) 1,000,000 years old.
 - E) All of the above.
11. In what type of environment would the greatest diversity of fossils most likely be found?
- A) Amber
 - B) Caves
 - C) Volcanic rock
 - D) Sedimentary rock
 - E) Coal
12. In an excavation, an area of layered rock is discovered to contain vertebrate fossils. Three of the fossils discovered are from a fish, early amphibian, and mammal. In what order, from bottom to top, were the fossils discovered?
- A) mammal, amphibian, fish
 - B) fish, amphibian, mammal
 - C) fish, mammal, amphibian
 - D) amphibian, mammal, fish
 - E) amphibian, fish, mammal

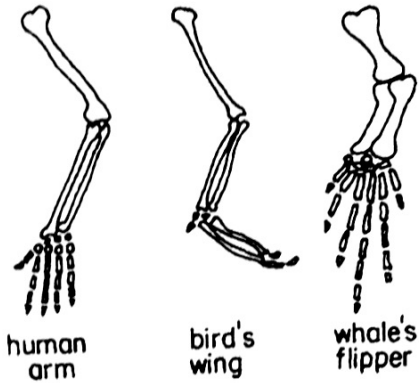
Evidence for Evolution

13. Which of the following is NOT true of species favored by the fossil record?
- They are supported by hard skeletons.
 - Their geographical distribution is concentrated.
 - They persist for long geological periods of time.
 - Their populations are generally large.
 - They possess outer shells.

14. The external similarity of insect wings and bird wings is an example of

- behavioral isolation
- geographic isolation
- adaptive radiation
- convergent evolution
- divergent evolution

15.



The diagram best represents which of the following?

- Survival of the fittest
- Acquired characteristics
- Common Ancestry
- Reproductive isolation
- Convergence

16. In terms of comparative anatomy, select the structure that is NOT homologous to the arm of an ape.

- The wing of an insect
- The flipper of a whale
- The wing of a bird
- The leg of a frog
- The arm of a man

17. Why are green algae thought to be the ancestors of land plants?

- They have homologies in lysosome structure.
- They share homologies in centriole composition.
- They share similar structure and pigmentation of chloroplasts.
- They have similar waxy cuticles.
- They have similar seed structure.

18. The tonsils and appendix are examples of

- vestigial structures
- balance polymorphism
- divergent evolution
- homologous structures
- analogous structures

19. The similarities of a bird's wing and a insect's wing are evidence of

- convergent evolution
- divergent evolution
- homologous structures
- parapatric speciation
- neutral selection

20. Molecular biologists cite as evidence for evolution similarities in

- amino acid sequences
- carbohydrate chains
- cellular components
- lipid composition
- nucleotide bases

2004 exam question 2 part a

Darwin is considered the "father of evolutionary biology." Four of his contributions to the field of evolutionary biology are listed below.

- The nonconstancy of species
- Branching evolution, which implies the common descent of all species
- Occurrence of gradual changes in species
- Natural selection as the mechanism for evolution

For each of the four contributions listed above, discuss one example of supporting evidence.

1. E
2. D
3. B
4. A
5. B
6. C
7. A
8. A
9. A
10. B
11. D
12. B
13. B
14. D
15. C
16. A
17. C
18. A
19. A
20. A

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Question 2

(a) For EACH of the four contributions listed below, discuss one example of supporting evidence.
(2 points each; 8 points maximum)

Contributions	Possible Examples of Evidence (1 point)	Explanation/Understanding of Phrase (1 point)
The nonconstancy of species	<ul style="list-style-type: none"> • Must demonstrate variation <ul style="list-style-type: none"> ◊ Finches, horses, dogs, whales, peppered moths, etc.... 	<ul style="list-style-type: none"> • Individual variation within a species/population (can be phenotypic or genotypic) • Change within species over time (not change in an individual) • Change in number of species over time
Branching evolution, which implies the common descent of all species	<ul style="list-style-type: none"> • Must demonstrate common ancestry <ul style="list-style-type: none"> ◊ Homology (embryological, structural, molecular, processes) ◊ Vestigial structure from common ancestor ◊ Hominoids, finches, etc... 	<ul style="list-style-type: none"> • <u>Shared</u> or common ancestor • Adaptive radiation concept (divergent evolution, one species becomes 2 or more)
Occurrence of gradual changes in species	<ul style="list-style-type: none"> • Must demonstrate change over time (generations) <ul style="list-style-type: none"> ◊ Vestigial structures (pelvic bones, appendix) ◊ Fossil sequence ◊ Coat color changes ◊ Giraffes' necks ◊ Antibiotic/pesticide resistance 	<ul style="list-style-type: none"> • Small changes <u>over time</u> / slow rate of change/incremental • Genes mutate → selection occurs → populations evolve • Accumulation of genetic/phenotypic changes
Natural selection as the mechanism for evolution	<ul style="list-style-type: none"> • Must demonstrate an appropriate natural selection effect <ul style="list-style-type: none"> ◊ Antibiotics/pesticide resistance ◊ Finches, moths, etc... ◊ Predator/prey relationships 	<ul style="list-style-type: none"> • Differential reproductive success • Survivors pass genes to next generation • <u>No</u> Lamarckian language (want, need...) • <u>No</u> "survival of fittest" <u>alone</u>

Note:

Examples in context may earn 2 points.

Possible examples are not limited to the listings above.

An example alone, without the context of the phrase = no points.