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FACULTY OF EDUCATION

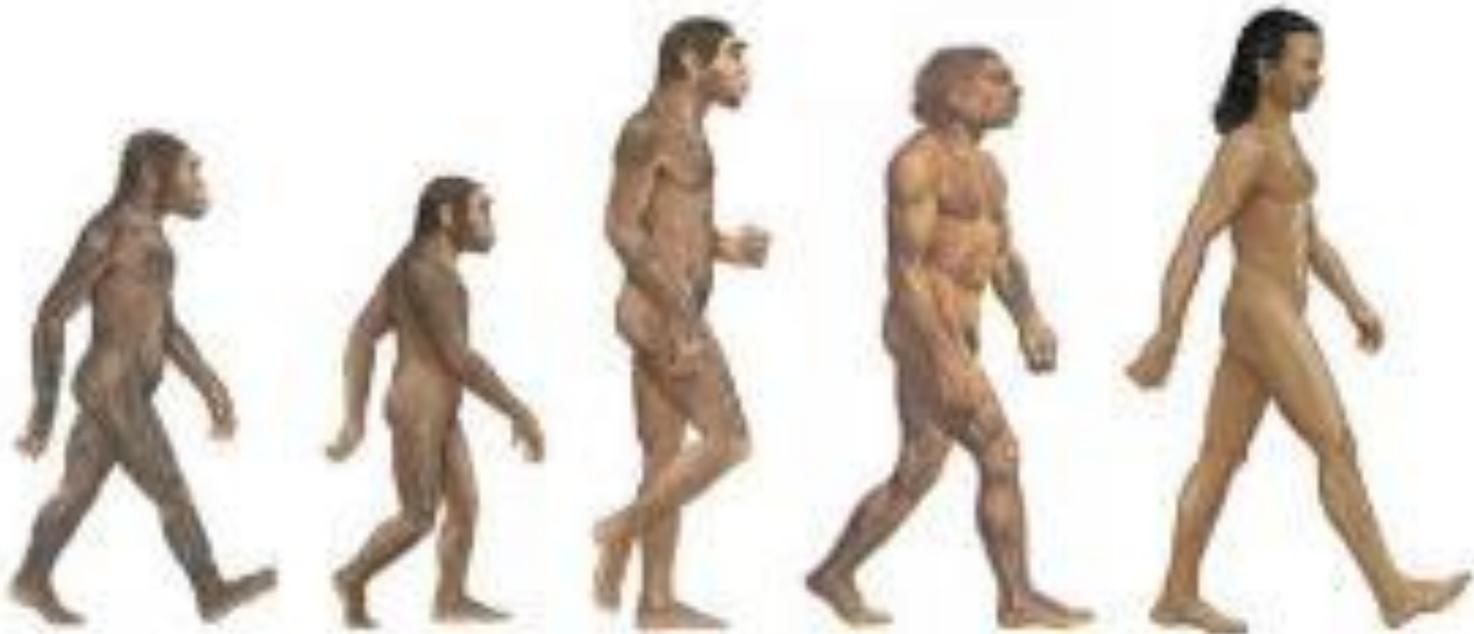
Department of
Curriculum and Pedagogy

Biology Evolution: Evolution I

Science and Mathematics
Education Research Group

Evolution

Human evolution



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Question 1

Which of the following is the most crucial driving force of evolution?

- A. Dynamic climate change
- B. Consequences of human influence
- C. Genetic Drift
- D. Natural selection upon beneficial mutations
- E. Founder Effect

Solution I

Answer: D

Justification:

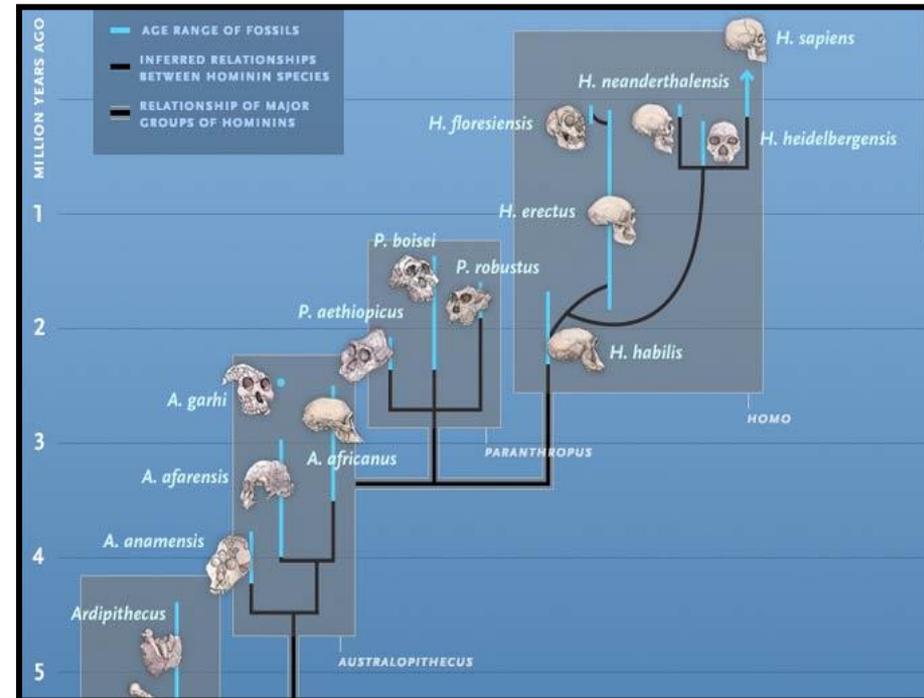
All five given examples can contribute to start evolution. However, natural selection upon beneficial mutation is a crucial component of evolution.

Therefore, the correct answer is D.

Question II

The fossil record of humans shows steady and ongoing changes. This linear pattern in the change of human evolution is known as ...

- A. Gene Flow
- B. Founder Effect
- C. Gradualism
- D. Bottleneck Effect
- E. Divergent Evolution



Solution II

Answer: C

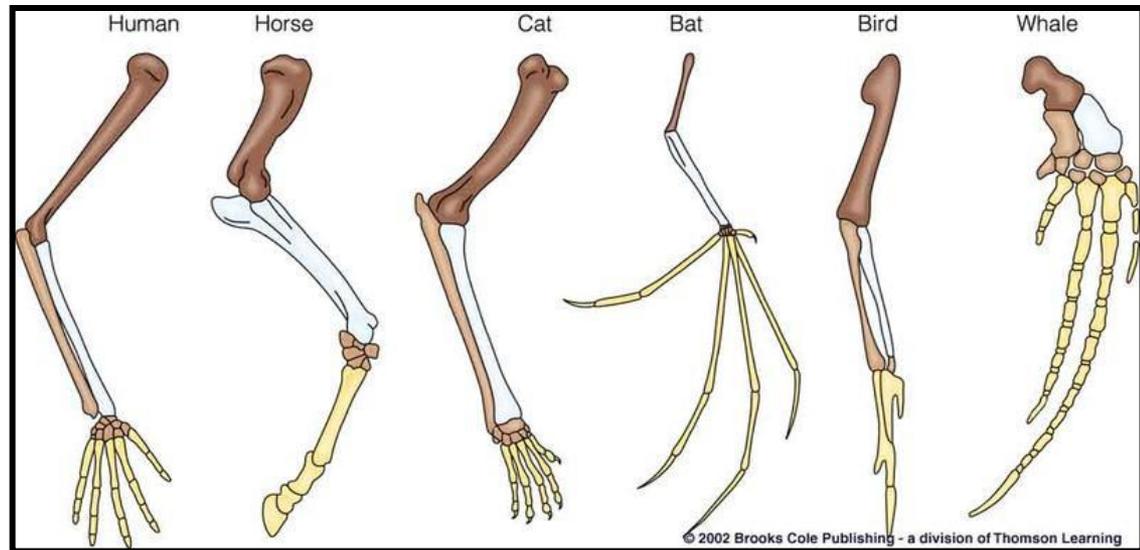
Justification:

- Gene flow is the movement of alleles or genes from one population to another.
- Founder Effect is the loss of genetic variation that happens when small number of individuals from a larger population establish a new population.
- Gradualism is selection and variation that happens when an organism evolves slowly and continuously over a period of time.
- Bottleneck Effect happens when environmental events decrease the size of a population for at least one generation, which in turn can decrease the population's genetic variation and make it more difficult for the population to adapt to new selection pressures.
- Divergent evolution refers to the accumulation of different traits in different populations or species from a common ancestral species. It is an evolutionary process that leads to speciation (the production of new species).

Question III

Scientists often study the bone structures of different organisms to examine their relationships and find evidence of evolution. The following diagram shows 6 different types of forelimb. What does this diagram illustrate?

- A. Speciation
- B. Analogous Structures
- C. Homologous Structures
- D. Vestigial Structures
- E. Divergent Evolution



Solution III

Answer: C

Justification:

- Speciation is the evolutionary process by which new biological species arise.
- Analogous Structures are structures that have similar functions and superficial resemblance to each other.
- Homologous Structures are parts of the body that are similar in structure to other species' comparative parts. These similar structures appear in different animals, underlining anatomical commonalities and a common ancestor.
- Vestigial Structures are body parts that have no distinct function or purpose (e.g. the Appendix).
- Divergent evolution refers to the accumulation of different traits in different populations or species from a common ancestral species. It is an evolutionary process that leads to speciation (the production of new species).

Question IV

A group of scientists have found a Tree Boa in the Amazon rainforest of South America, while another group of scientists found a Tree Python in a part of Australia. In a snake conference, the two groups found that the Tree Boa and the Tree Python share the same characteristics in the way they look and live. What does this finding exemplify?

- A. Convergent evolution
- B. Gradualism
- C. Sympatric speciation
- D. Habitat isolating mechanism
- E. Allopatric speciation



Solution IV

Answer: A

Justification:

- Convergent evolution describes the independent evolution of similar traits between two organisms that are not closely related to each other, usually as a result of having to adapt to similar environments.
- Gradualism is selection and variation that happens when an organism evolves slowly and continuously over a period of time.
- Sympatric speciation is a process whereby two individual populations diverge from an ancestral species without geographical separation.
- Habitat isolating mechanism is a mechanism which isolates species to prevent them from fusing/breeding with other types of species.
- Allopatric speciation happens when two populations of the same species are isolated from each other, develop different characteristics in their separation, and eventually form two distinct species.

Question V

Long before Darwin's proposal of natural selection, farmers were selecting wild mustard plants to produce new types of crops. The broccoli plant was derived by selecting wild mustard plants with reduced flowers over time. Which of the following terms best describes this type of selection?

- A. Allopatric speciation
- B. Sympatric speciation
- C. Pre – Darwinian theories
- D. Artificial selection
- E. Sexual selection



Solution V

Answer: D

Justification:

- Allopatric speciation happens when two populations of the same species are isolated from each other, develop different characteristics in their separation, and eventually form two distinct species.
- Sympatric speciation is a process whereby two individual populations diverge from an ancestral species without geographical separation.
- Pre – Darwinian theories are theories that resemble the theory of evolution that were proposed by different philosophers and scientists in the years before Darwin.
- Artificial selection is the intentional breeding of plants or animals with desirable traits. This evolution of the plants or animals is artificial because humans select the desirable traits instead of nature.
- Sexual selection is a type of natural selection in which some individuals out-reproduce others of a population because they are better at securing mates (they have more desirable traits).