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7.4 THE EVIDENCE OF EVOLUTION p. 296

1. FOSSIL RECORD

The record of species in uncovered fossils.

2. BIOGEOGRAPHY

The study of the geographic distribution of living species and fossils

3. COMPARATIVE ANATOMY

HOMOLOGOUS FEATURES

Structures with a common evolutionary origin that may serve different functions in modern species

ANALOGOUS FEATURES

Structures that perform similar functions as another but is not similar in origin or anatomical structure like bird and insect's wings.

VESTIGIAL FEATURES ex. Buffon's pig toes

A rudimentary and non-functioning / marginally functioning structure that is homologous to a fully functioning structure in closely related species

Explain why humans have goosebumps.

In extreme cold or emotion, hair follicles are constricted, causing the skin to form a bump and the hair to stick out. Closely related species have feature-expanding tendencies activating in response to stress.

4. EMBRYOLOGY

Development of embryos is similar between closely related species

In the late 1830's Darwin read *Esssay on the Principle of Population*, by Malthus. How did this essay influence Darwin's thoughts?

He realized that species were not immutable and the environment as a key factor that influences inhabiting species

5. MOLECULAR BIOLOGY

p.303 #1, 2, 5

1. a) Hummingbirds - constitution requires less maintenance

   b) Reptile: Greater travel capability

   c) Similar: Similar genetics that enables them to live on land

   d) Found in other remote islands: Able to travel to island from central land mass
2. They are exposed to predators on the central land masses

5. The anatomy is similar to other species with 5 toes showing that the species are related to each other.

7.5 ON THE ORIGIN OF SPECIES p. 304

<u>The Theory of Evolution by Natural Selection</u>

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Natural Selection - Some individuals enjoy greater reproductive success than others in a population

Adaptation - A characteristic or feature of a species that makes it well suited for survival or reproductive success in its environment

In order for natural selection to occur, the following conditions are necessary:

1. In each generation, populations produce more offspring than there are adults

2. Individuals within the population do not continue to grow in size

3. Some variations are adaptations

4. Over time, the population will change to possess more advantageous hereditary characteristics that become more common generation after generation.

Polar bears have grown in size over thousands of years as their habitat for hunting grew, providing them with more prey. Climate change has recently dramatically reduced the amount of ice on which polar bears live. Predict the future for polar bears, based on the theory of evolution by natural selection.

They will either go extinct or adapt to swim for longer periods of time in warmer climates.

p. 307 #1, 2, 7

1. a)Darwin prepared a manuscript of his theory and gave it to his wife to publish after he died

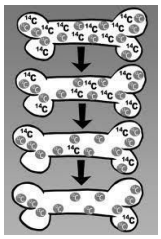
   b) He was part of the Linnean society of London, most of whom objected to the theory of evolution

2. a) His findings further verified his theory of evolution

7.6 THE MODERN THEORY OF EVOLUTION p. 308

Until well into the nineteenth century, many people believed the Earth was less than

years old. Today scientific consensus says the Earth and our solar system is *4.5 billion years old*.



Radiometric Dating

What are radioisotopes? Radioisotopes are atoms with an unstable nucleus, capable of undergoing radioactive decay

What is meant by the value, "half-life"?

The amount of time required for half of the quantity of a radioactive substance to undergo radioactive decay

Gene Pool- The complete set of all alleles contained within a species or population.

What are homologous genes? Genes that encode for similar traits

What are pseudogenes? Give an example.

A vestigial gene that no longer codes for a functioning protein. Dolphins have 800 out of 1000 olfactory receptors that do not function

Gene duplication is possible on a chromosome due to an error in crossing over. Explain.

Misalignment in gene crossover can yield a duplication of a gene encoding for identical traits

Explain why the ability to smell sugar is an adaptation.

Sugar is a necessary micronutrient and the ability to smell it increased survival rates.

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If you had gene duplication for this gene, the second gene is obsolete (assuming no advantage due to the ability to detect a lower concentration with double proteins). How could a point mutation on this double cause the owner to be able to smell something new and how this could be selected for.

The protein composition could result in an ability that allows one to smell necessary macronutrients. This trait may favour succession.

P. 313 #3 – 9

3. A) Parent and daughter isotopes differ in the number of neutrons in the nucleus. 1 half-life corresponds to a decrease in the number of neutrons within the nucleus.

   B) Species evolve based upon allele combinations.

   C) Errors in crossing over yield duplication of genes in the same gene family.

4. Bacteria develop adaptations very quickly and evolve very fast.

5. They are genes encoding information of traits for the same characteristic.

6. The land mammals have not lost their olfactory receptors as their environment requires their use.

7. Lemurs evolved from the lystrosaurus.

8. A) No, the reading frames have not changed

   B) Species A and C

9. A) No, we are related to species that require this gene.

   B) All carbon molecules undergo radioactive decay and continue to do so.