

Define the following terms:

Niche

Adaptagent

Shelford's law

Poikilothermic endotherm

Positive allometry

Pseudogene

Optima

Fill in the blank

Rapid physiological change in response to change in a single adaptagent is called _____ while change in response to a suite of new conditions is _____. Neurological or behavioral adjustments to new stimuli are called _____.

Species that can tolerate a wide range of temperatures are called _____. If that same species expends energy maintaining body temperature within a certain range (despite changes in the outside temperature) we also call it _____. Finally, while that species maintains body temperature within this range, it is a wide range and the body temperature is quite variable. That species is therefore also _____.

Evolution should alter _____ to maximize _____ fitness in the occupied environment.

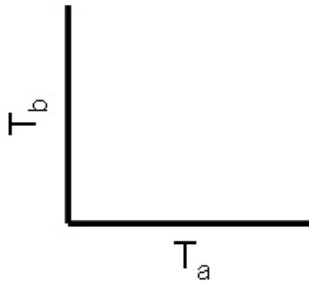
_____ results in changes to a phenotype due to gene by environment interactions.

If a structure size or process rate scales evenly with size, we say that structure or process is _____. However, if something increases proportionately faster than size we call it _____ and if it decreases with size it is _____.

Duplication of genes can result in multiple copies of a gene that may all evolve independently. The term _____ refers to a group of related genes that have a common phylogenetic history but may now code for different proteins.

Essay

Phenotypic plasticity, evolution and acclimation are all responses to changes in the environment. Define each type of response, including the mechanism involved, how quickly it occurs and whether or not it is reversible. Provide examples of each.

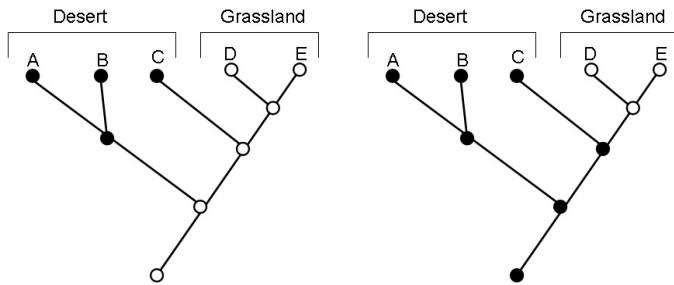


On the axes to the left, draw and clearly label (as a,b and c) lines you would expect for the following:

- eurythermic regulator
- eurythermic conformer
- stenothermic regulator

T_b : body temperature
 T_a : ambient temperature

Species A, B and C are found in desert habitats while two sister species (D and E) are found in grassland. You are interested in the evolution of a physiological trait that is only seen in the desert species (closed circles). You have determined the phylogenetic relationships indicated below. Assume the phylogenies below where the presence or absence of the trait of interest differs among ancestral species (you have no information about the habitat use of ancestors). Which of the two phylogenies better supports the hypothesis that this trait evolved in response to a desert environment? Explain why.



Given the allometric equation $Y=am^b$ what do a and b represent? When looking at the allometric relationships, why is b often compared to the numbers 1.0 and 0.67?

For a given phenotypic trait, if $a=20$ and $b=0.85$, what is the expected trait value for an organism with a mass of 5kg?