GATE - Ecology and Evolution PYQs

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Ecology and Evolution

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Q. 11	The molecular clock model assumes that mutation rates are
(A)	equal for all genes.
(B)	constant for a gene.
(C)	variable across geographical regions.
(D)	variable across geological time.

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- The Molecular Clock presumes that genes (single or multiple different genes) mutate at a relatively ***constant rate*** for different lineages. Considering that each population size can differ with the generation time for different species poses a problem with the accuracy of dating back timescales. (study.com)

- The molecular clock consists of a number of genes that form transcriptional and posttranscriptional feedback loops, which function together to generate circadian oscillations that give rise to circadian rhythms of our behavioral and physiological processes. (sciencedirect.com)

- Scientist associated - **Motoo Kimura**

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If α-diversity is diversity of pathogen per host and β-diversity is diversity of pathogen between the two host and γ-diversity is overall diversity. If γ-diversity is constant and α-diversity increases then-

(1) β-diversity will also increase

(2) β-diversity will decrease

(3) Both β and γ-diversity will increase

(4) Both β and γ-diversity will decrease

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Ans:

α-diversity = within a habitat (local measure)

β-diversity = between two habitats

γ-diversity = overall diversity

$$\beta = \frac{\gamma}{\alpha}$$

given, γ – is constant

α – is increasing

so, β - should decrease

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Q. 12	The intermediate disturbance hypothesis was proposed to explain patterns of
(A)	species redundancy.
(B)	species diversity.
(C)	species dispersal.
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During the last decade many attempts have been made to explain ***phytoplankton dynamics*** and ***species diversity*** in lakes within the theoretical framework of the **intermediate disturbance hypothesis** [**IDH** (Padisák et al., 1993)].

The **IDH** states that **species diversity is low** after a disturbance, when only a few species have survived or few colonizing species dominate under the new environmental conditions, or when the system has approached an equilibrium stage which is dominated by few species with high competitive abilities.
Diversity is high when disturbances occur at an **intermediate frequency** or with **intermediate intensity** (Grime, 1973; Connell, 1978).

In this respect, a drastic change in **water column** mixing depth can be regarded as a disturbance since it alters the competitive conditions through changes in nutrient and light availability (Reynolds, 1993). (https://academic.oup.com)

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Q. 13	A few years ago, a very small population of zebrafish became isolated by a newly built dam. As a result, which statement is most likely to be true about this population of zebrafish now?
(A)	Genetic variability is low.
(B)	Fixation of genotypes due to drift is low.
(C)	Inbreeding is low.
(D)	Mutation rate is high.

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Q.14	A researcher measures the heights of 200 randomly selected individuals of a tree species in a forest. Which one of the following is NOT a measure of variability in the sample?
(A)	Inter-quartile range
(B)	Range
(C)	Standard deviation
(D)	Standard error

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Q. 15	Individual lizards were repeatedly presented with a predator model. Over successive trials, they showed a reduction in the duration of their alarm response. Which one of the following is this an example of?
(A)	Imitation.
(B)	Imprinting.
(C)	Habituation.
(D)	Sensitisation.

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Habituation is one of the most fundamental learning processes that allow animals to adapt to dynamic environments. It is ubiquitous and often thought of as a simple form of non-associative learning. Very little is known, though, about the rules that govern habituation and their significance under natural conditions. Questions about how animals incorporate habituation into their daily behaviour and how they can assure only to habituate to non-relevant stimuli are still unanswered. Animals under threat of predation should be particularly selective about which stimuli they habituate to, since ignoring a real threat could be fatal. In this study, we tested the response of fiddler crabs, *Uca vomeris*, to repeatedly approaching dummy predators to find out whether these animals habituate to potential predators and to test the selectivity of the habituation process. The crabs habituated to model predators, even though they were confronted with real predators during the same habituation process. They showed remarkable selectivity towards the stimulus: a simple change in the approach distance of the stimulus led to a recovery in their responses. The results strongly indicate that in the context of predator avoidance, habituation under natural conditions is highly selective and a stimulus is not defined just by its current sensory signature, but also its spatio-temporal history. (Source: https://www.ncbi.nlm.nih.gov)

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Q. 16	Among the following vertebrate classes, biparental care is most common in
(A)	amphibians.
(B)	birds.
(C)	fishes.
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Biparental care is a form of care where both male and female parents contribute to raising offspring, with females typically providing more care than males. It is more common in **amphibians** and **birds**, and arises from social environmental factors such as mating opportunities and securing them.

(Source: https://www.sciencedirect.com)

Bi-parental care is most common form in **birds**, scientists have long assumed that it is the most primitive form of care.

Thank you!

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