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Assignment of Cell Biology, Genetics and evolution

Department:-

BS Zoology

Topic:-

Adaptive Radiation

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Adaptative Radiations

“Evolution of ecological and phenotypic diversity within rapidly multiplying lineage is called adaptive radiation.” It starts with a recent single ancestor. This process results in the speciation and phenotypic adaptation of species. Adaptive radiation can be graphically illustrated as a bush, or clade, of coexisting species on the tree of life.

Identification:

Four features can be used to identify an adaptive radiation.

1 Common ancestry of components species:

Specifically a recent ancestry.

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2 Phenotype - environment correlation:

A significant association between environments and the morphological and physiological traits used to exploit those environments.

3 Traits utility:

the performance or fitness advantages of trait values in their corresponding environments.

4 Rapid speciation:

Presence of one or more bursts in the emergence of new species at the time of ecological and phenotypic divergence.

Causes:

1 The evolution of a novel feature. It may permit a starts to diversity by making new areas of morphospace accessible. A classic example is the

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evolution of fourth cusp in the mammalian tooth. This trait permits a vast increase in the range of feedstuffs which can be fed on.

2 Evolution of this character has thus increased the number of ecological niches available to mammals.

⇒ Birds find other ways to provide for each other, i.e., the evolution of flight opened new avenues for evolution to explore, initiating an adaptive radiation.

3 Adaptive radiations often occur as a result of an organism arising in an environment with unoccupied niches, such as newly formed lake or isolated island chain.

4 Adaptive radiations commonly follow mass extinctions; following extinctions, many niches are left vacant. A classic example of this is the replacement of non-avian dinosaurs with mammals at the end of the Cretaceous, and of brachiopods by bivalves at the Permo-Triassic boundary.

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e.g.:

Analogous organs show convergent evolution.

Australian Marsupials and placental mammals various aquatic vertebrate and (things) wings of insect, and bat.