B.Sc. Part III Paper VII

Zoology (Hons)

Micro, Macro and Mega Evolution (Part I)

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Introduction :- Goldschmidt (1940) divided evolution into micro; meso and megaevolution. Microevolution stands for evolution on a small scale i.e. that of subspecies. Macroevolution stands for evolution on species level and genus level, while megaevolution stands for really large scale evolution i.e. on families, orders, classes and phyla. Evolution at these levels receives much attention from students of the fossil record. B. Rensch (1959) has modified the term microevolution into intra-specific evolution and macroevolution into trans-specific evolution. Colbert (1983) has regarded macroevolution as cladogenesis or groupings.

For several years (1976 to 1982), Stephen Jay Gould and Niles Eldredge of the American Museum of Natural History have questioned the conventional views

that evolutionary changes in the distant past are principally the outcome of the gradual accumulation of slight inherited variations. They advocated the most evolutionary change has consisted of rapid bursts of speciation alternating with long periods in which the individual species remain virtually unmodified. Gould & Eldredge maintain that most lineages display such limited morphological changes for long intervals of geologic time as to remain in stasis or in Equilibria. Conspicuous or prominent evolutionary changes are concentrated in those brief periods when the lineages actually split or branch. This is called hypothesis of punctured Equilibria. Further, branching from a single lineage (or a single line of descent) during macroevolution, will ultimately produce a cluster of lineages known as clade. Thus, branching sometimes is called cladogenesis. when referring to a clade or to a group of related clads, it is common to use the adjective phylogenetic. Hence, Phylogenetic pertains to a evolution of phylogeny consisting of more than one lineage. whereas phyletic refers to a single lineage.

Moreover, a lineage reconstructed from fossil data may exhibit sufficient evolutionary changes that a taxonomist deems it appropriate to decide it into two intergrading species. Such species are known as "chrono species", successional species, palaeospecies or evolutionary species.

Micro Evolution — Evolutionary changes in population are ordinarily visualised as gradual, built upon many genetic variations that arise and are passed on from generation to generation. The shifting the gene-frequency in local population may be thought of as microevolution. The progressive replacement of light coloured moths by dark moths, in industrial region in England exemplifies the microevolution. It has also been observed in Chotanagpur plateau region of Jharkhand, India. Most population geneticists endorse the view that the same microevolutionary process has been involved in the major transformations of organisms over longer spans of geologic time. (microevolution). The traditional out...

work is that small variations gradually accumulate in evolving lineages over period of millions of years.

Macroevolution → The most significant feature of this kind of evolution is a progressive, sustained tendency for certain characters to develop along it evolutionary line. Trends of this sort are numerous in the fossil record. Long term progressive trends rarely appear in only one structure, but almost always involve a complex of different features. In fact, trends are produced by driving force of natural selection, operating within the limits of a particular adaptive zone or sub-zone. Evolution is not random; although certain elements in the process are random and trends leading to greater efficiency are to be expected. Evolutionary trends are generally, adaptive movements along one path way, but they are never exclusively sequential and always involve divergent and repeated taking up of one or the other characters important in the trend. — —

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