Micro and macro evolution

At its simplest, evolution is any change in heritable traits in the organism population for generations. These changes may be due to natural selection, genetic drift, mutation, etc. All populations experience a change in evolution that affects their environment, their interaction with other organisms, and random chance. Like ecology, we can consider evolution on different scales. Microevoluution is a genetic change that occurs in small intervals and leads to small changes in recoverable traits. For example, Drs. Peter and Rosemary Grant studied medium-sized landspeeds (Geospiza fortis, Figure 1.3.1) in the Galápagos Islands for more than 40 years, monitoring body size, beak size, weight and other traits throughout the population for several generations. In 1977, a major drought hit daphne major island, where grants were carrying out their research. The drought caused a change in the vegetation of the island, whose seeds are a food source for land finches. During the generation following the drought, the grants document the increase in the beak size of land finches in response to the change in seeds they feed on. This relatively small change in the excitable feature between generations is the microevoletion response to the drought of 1977. Picture \(\PageIndex{1}\): Medium-sized land finch, Geospiza fortis. Photo by Wikimedia Commons1. Macroevolysis is a genetic change that occurs in the long term, leading to major changes in inherited traits in the population; the changes are so large that we consider this population to be a unique level-level group or species. Macroevolysis is sometimes also called a specification (the process by which a new species is born). This is the extent of evolutionary change that most people think of when someone mentions evolution. For example, a medium-sized land finch is not the only finch species in the Galápagos Islands. The genus Geospiza contains nine species, all of which can be found exclusively in the Galápagos Islands. About 2 million years ago, the ancestor of these species moved to the Galápagos Islands from South America. By then, the birds migrated to the Galápagos Islands, and between generations experienced various microevolytion changes. In the end, these small differences accumulated to the point where individuals of different populations are genetically distinct, no longer interbreeding with each other and performing different ecological roles in the habitat (for example, some feed on seeds, while others feed on insects). We therefore now regard them as different species. Geospiza is not the only group of finches in the Galápagos Islands - Figure 1.3.2 illustrates the differences in head and beak shape between finch groups on several islands. Picture \(\PageIndex{2}\): Beak and the shape of two Geospiza finches and two other species of Galápagos finch. Clockwise from top left: Geospiza magnirostris, Geospiza fortis, Certhidea olivacea, Camarhynchus parvulus. Photo by Wikimedia Commons2. It is important to note that microevoluution and macroevolysis are not different processes. Both are associated with genetic changes in the population for generations; the only difference is the timetable on which the two operate. Macroevolysis is the accumulation of microevoluution changes over a long period of time to the point where the population is unique from other populations and is considered a separate species. Evolution on a scale at or above the species Part of John Gould's evultion biology series Main topics Introduction to evolution Common calculation Evidence Processes and results Population genetics Diversity Mutation Natural selection Adaptation Polymorphism Genetic flow Specification Adaptive science Cooperation Coexistence Differences In Coexistence Convergence Extinction Natural History Life History Life history Evolutionary Timeline Human Evolution Fylogenia Biodiversity Biodiversity Classification Evolutionary Taxonomy Cladistics Transitional Fossil Extinction Event History of Evolutionary Theory Overview Renaissance Before Darwin Origin of Species Before Synthesis Modern Synthesis Molecular Development Evo-devo Current Research Paleontology History (Timeline) Evolutionary History Applications Biosocial Criminology Ecological Genetics Evolutionary Aesthetics Evolutionary Anthropology Evolutionary Component Utation Evolutionary Ecology Evolutionary Economics Evolutionary Epistemology Evolutionary Theory evolutionary linguistics Evolutionary neuroscience Evolutionary neuroscience Evolutionary physiology Evolutionary psychology Experimental EvolutionAry Phylogenetics Paleontology Selective Breeding Spectronics Sociobiology Systematic Universal Darwinism Societal Effects Evolution Such as Fact and Theory Social Effects Creation–Evolution Dispute Evolutionary Support Level Evolutionary Biology Portal Class Related Subjective Macro evolution in the current sense is evolution, controlled by the choice between isolated variations instead that it would be a choice between the inning variation of the microevolt. [1] [2] [3] This modern definition differs from the original concept of macroevolysis referring to the development of taxa above the species level (genealogy, families, assays, etc.). [4] The origin and changing meaning of the term Philiptschenko[4] distinguished between microevolousness and macroevolousity because he rejected natural selection in the darwin sense[5] as an explanation for the larger evolutionary transitions that give rise to a tax base above the linnean species level. Thus, he limited darwinian microevoluuty to evolutionary changes limited to certain species that can lead to more or more different breeds or subs. Instead, he pointed to major evolutionary changes in macroevolysis that correspond to the natural differences above the species level, which, in his opinion, would require evolutionary processes that differ from natural selection. The explanatory model of macroevolutium in this sense was the hopeful monster concept of geneticist Richard Goldschmidt, who proposed evolutionary changes in salting, either due to mutations affecting the frequency of development processes[6] or changes in chromosome pattern. [7] In particular, the latter idea was widely rejected in modern synthesis and is refuted today, but a hopeful monster concept based on evo-devo explanations found a moderate revival recently. [8] [9] As an alternative to the evolution of salting, Dobzhansky [10] suggested that the difference between macroevoluution and microevoltation substantially reflects the difference in the time scale and that macroevobutional changes were simply the sum of microevoletion changes over geological time. This view was widely accepted and therefore the term macro evolution has been widely used as a neutral label in a very broad time frame in the study of evolutionary changes that crash in formulae. [11] However, the concept of species selection[1] has called into question the principle that large-scale evolutionary models were ultimately deductible for microevoly, suggesting that interspecies selection is a major evolutionary factor independent of and complementary to the selection of organisms. Consequently, the level of selection (or, more generally, sorting) has become the conceptual basis of the third definition, defining macro-evolution as evolution by a selection between interspecies variations. [3] Macroevolution processes Specific article: specification According to modern definition, the evolutionary transition from pre-age to subsidiary is microevolutional due to the selection (or, more generally, sorting) between different organisms. However, the specification also has a macroevolutionary perspective, since it produces a species selection of species variability. [3] Another macroevoletion aspect is its success rate, which corresponds to reproductive success in microevolysis. [1] Species selection The selection of species largely works on the basis of the variation offered by the random specification process and favours species that have large or surviving long periods of time and therefore generally leave many daughter species. [1] Species selection includes:(a) effect macroevolysis, in which organism-level traits (aggregated traits) affect the specification and extinction rates (Stanley's and (b) a keen selection of species in which species-level characteristics (e.g. geographical area) affect the specification and extinction rates. [12] It has been argued that macro-positiveness is deductible for microelvolysis because both work through the selection of organismal properties[13], but Grantham[14] showed that macroevoletion can resist selection at organism level and therefore is not deductible microevoluution. Cases where the same trait has opposite effects on the organism and at species level have been carried out at the time of sexual selection[15][16][17], which increases the condition of the individual but may also increase the risk of extinction of the species. Precise balance The main article: punctuated balance Punctuated balance is assumed that evolutionary change is geologically concentrated during the short specification phase, followed by evolutionary stasis, which continues until the species goes extinct. [18] [19] The prevalence of evolutionarystasis for most of the time the species exists is an important criterion for the importance of species selection in shaping the evolutionary history of clans. However, interlaced balance is not a macro-formulation model and is not a prerequisite for selecting species. [12] Examples evolutionary fauna Macroevoluutional comparative study is sepkoski's[20][21] work to promote marine animal diversity through phenerozotics. His iconic diagram of the number of marine families, from Kambrian to Recent, illustrates the successive expansion and dwindling of three evolutionary fauna characterized by differences in origin volumes and carrying capacity. Mass extinction Main article: extinction event The macroevolouous significance of environmental changes is most clear in global mass extinction events. Such events are usually caused by massive disturbances in the non-biotic environment, which occur too quickly due to a change adaptable to the microevulation rate. Mass extinction therefore works almost excursively through species, i.e. macroevolutionary selection. Mass extinction strongly affects species in an unadsisted way of evolution. [22] A classic example in this context is the suggestion that the decline of brachiopods, apparently reflected in the rise of bivalve molluscs, was in fact due to the different survival of these tails during the mass extinction of the end of The Permian. [23] Stanley Rule Macroevoluution is based on differences between species in origin and extinction rates. It should be noted that these two factors tend to be positively correlated: taxes with typically high degrees of dispersion are also high from extinction. This finding was first described by Steven Stanley, who attributed it to many ecological factors. [24] However, positive correlation and extinction rates are also a prediction of the Red Queen's hypothesis, which assumes that the evolutionary progress (increased condition) of any species will cause the condition of other species to deteriorate, ultimately driving the extinction of those species that do not adapt quickly enough. [25] High degree of origin must therefore be correlated with high extinction rates. [3] The Stanley Rule, which applies to almost all taxa and geological eras, is therefore a strong indication of the dominant role of biotic interactions in macroevoletion. The subjects studied in macroevolyus are:[26] Adaptive radiations, such as the Cambrian explosion. Changes in biodiversity over time. Genome evolution, such as horizontal gene transfer, genomic fusions in endosymbiosis and adaptive changes in genome size. Mass extinctions. Assessment of the degree of diversification, including specification and extinction rates. A debate between precise balance and graduality. The role of development in shaping evolution, especially heterochronics and phenotype plasticity. See also Microevolution Speciation Unit of selection Red Queen hypothesis extinction event interspecific competition

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