Stasigenesis Encyclopedia Article

Stasigenesis

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Stasigenesis

Stasigenesis is the apparent absence of observable change (**evolution**) in a population over time. In terms of **genetics**, a population that remains observably stable (stasigenic) over time is a phenotypically stable population. Although a population may be phenotypically stable there are still underlying changes that constantly occur at the genetic molecular level. When a population is stasigenic, the **evolutionary mechanisms** that cause genetic changes (or result in changes in the **gene pool** of a population) do not result observable (phenotypic) changes upon which **natural selection** acts.

The existing fossil record reflects extended periods of stasigenesis for the majority of **species**. In fact, stasigenesis is the most common macroevolutionary pattern found in the fossil record. This evolutionary stagnation (stasis) is often explained by evolutionary biologists as a result of a lack of variation in traits upon which the mechanisms of natural **selection** can act to drive genetic and phenotypic change.

Stasigenesis is also linked to environmental change. Genetic changes, acted upon by selection, result in species well adapted to their environments. If a population is well adapted to its environment, and that environment remains stable, the random mechanisms of genetic change may cancel out, produce changes (mutations) that remain at very low levels within a population, or not be sufficient to produce observable change. As a result, once a species is well-adapted, changes must occur as a result of environmental change or as a result of random genetic changes (e.g., mutations).

Within a stasigenic population, where there is stability in the phenotype from one generation to the next, a genetic **mutation** resulting in a phenotypic difference may be subjected to tremendous selective pressure (i.e., the change may be so great that it is lethal to the individual or otherwise has a significant and adverse impact on reproductive success). In this case, the evolutionary mechanisms of selection are stabilizing in that they act to conserve the existing genes (**genome**).

Stasigenesis is a type of macroevolution that contrasts with gradual changes in phyla caused by small but measurable differences in observable (phenotypic) traits) and with more rapid changes (**punctuated equilibrium**). Macroevolutionary changes ultimately reflect genetic changes significant to produce changes in structure and function (e.g., changes to wing structure and function). In accord with the theory of punctuated equilibrium, populations may remain stasigenic (stable) for extended periods between periods of rapid change that can result in genetically incompatible species and or extinctions.