

Neoteny in Amphibian

Neoteny

The term neoteny was coined by Kollmann. Neoteny means the retention of a larval or embryonic trait in the adult body such as retention of embryonic cartilaginous skeleton in adult Chondrichthyes; and larval gills in some adult salamanders.

Amphibians may either be looked upon as adults, which retain certain larval characteristics. This is neoteny. Or, they may be considered larvae in which reproductive organs develop precociously which is paedogenesis. The classical and most informative examples of neoteny and paedogenesis among Amphibia (vertebrates) are furnished by *Ambystoma*.

A. mexicanum lives in Lake Xochimilco in the highlands of Mexico and the closely related *A. tigrinum* (tiger salamander) in high altitudes of Colorado (North America). Ordinarily they go through typical gilled aquatic larval stages, then metamorphosis, to transform into adult air-breathing land forms.

Though, under certain circumstances, the larvae do not undergo metamorphosis, instead they retain their gills and aquatic habitat but grow into sexually mature. This sexually mature but morphologically immature, larval stage having external gills is called an axolotl.

Natives of Mexico who captured them for food gave the name axolotl. In Aztec axolotl means 'servant of water'. At one time axolotls were considered a separate genus, *Siredon*, *S. axolotl*, *S. mexicanum*, *S. pisciformis* etc. (Wagler, 1830).

However, in 1865, some axolotls brought to Paris in France discarded their gills and fins and underwent metamorphosis to become adult terrestrial salamanders.

Environmental factors that affect neoteny

The significance and causes of neoteny are not properly understood. Abundance of food, cold temperature or insufficient iodine (a constituent of thyroxin hormone inducing amphibian metamorphosis) may cause failure of metamorphosis and retention of larval features. This is supported by the fact that drying up of swamps, scarcity of food and increase in surrounding water temperature induce axolotls to metamorphose. As axolotls bred in Mexico and south-western parts of U.S.A. When transferred to the eastern states or experimentally treated with thyroxine or TSH, these axolotls lose their gills, assume lungs and become adult air-breathing native tiger salamanders. Response of larval tissues to thyroid hormones is reduced as temperature drops and disappears entirely below 5°C. The genetic basis for metamorphosis seems to be multi factorial variable and subject to selective pressure.

The cause of neoteny among amphibians has not been properly understood. Various extrinsic and intrinsic factors are supposed to be responsible for such an unusual phenomenon.