

NEOTENY



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Neoteny and Paedogenesis

Neoteny: Retention of a larval or embryonic trait in adult.

Examples:

cartilaginous skeleton in adult Chondrichthyes

larval gills in some of the salamanders

Paedogenesis or paedomorphosis: development of gonads and/or production of young ones by larva.

Examples: found in gall fly, liver fluke, salamanders

Cause of Neoteny among amphibians

Extrinsic Factors:

(1) Abundance of food and other favourable conditions in aquatic environment (Gadow, 1903)

(2) Deep-water & coldness inhibits the secretion of thyroxin (Shufeldt)

(3) Salinity of water (Weismann)

(4) Low temperature arrests metamorphosis (Huxley, 1929).

It is not clear whether extrinsic factors are exclusively responsible for neoteny.

Intrinsic factors

Gressner (1928) opined that insulin hormone inhibit metamorphosis.

Recent investigations reveal that metamorphosis is primarily influenced by —

- (i) Different threshold levels of thyroxin and its analogues
- (ii) Degree of responsiveness of larval tissues to hormones

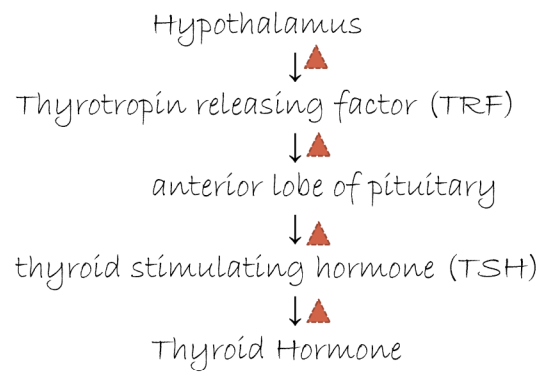
Etkin and his coworkers (1928) have shown

- ❖ Prolactin acts as an inhibitor of metamorphosis
- ❖ Level of prolactin remains high

Modern genetics may suggest

1. structural genes that guide the synthesis of thyroxin are 'switched off' by some operator genes,
2. Genes guiding the formation of prolactin are "switched on"

Hence, Hypothalamus becomes sensitive thyroid level in blood stream.



During prometamorphosis, TSH prolactin are antagonistic hence, metamorphosis starts

Poor secretion of thyroid hormones and irresponsiveness of larval tissues to thyroid hormone are responsible for neoteny.

Types of neoteny

Partial Neoteny: Metamorphosis is delayed due to temporary ecological or physiological changes in environment.

e.g. tadpoles and larvae tiding over winter

Intermediate neoteny: Axolotls which reproduce sexually but undergo metamorphosis in suitable conditions.

Extreme or total neoteny: e.g. *Necturus*, *Siren* and *Proteus*.

