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Mini Review

THE PROCESS OF AMPHIBIAN METAMORPHOSIS AND THE RELEVANCE OF GILLS

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INTRODUCTION

In amphibians, metamorphosis refers to the transformation of the larva into a small adult duplicate, and frequently from an aquatic to a terrestrial or semi-terrestrial habitat. The end of larval life is marked by metamorphosis. Amphibians use gills for breathing early in life and acquire primitive lungs as adults; they can also breathe via their skin. Most mature amphibians can breathe via cutaneous respiration and buccal pumping, however some still have gills. In comparison to reptiles, birds, and mammals, amphibians have primitive lungs. This implies they have to deal with delayed oxygen diffusion through their blood. Frogs are not the only animals that undergo metamorphosis; most other amphibians, as well as many invertebrates, undergo significant changes throughout their life cycles.

Metamorphosis is a biological process that occurs after an animal is born or hatches, involving a noticeable and generally sudden change in the animal's body shape due to cell development and differentiation [1]. Metamorphosis is an ancestral trait of all chordates that is triggered by iodothyronine. Metamorphosis occurs in insects, fishes, amphibians, mollusks, crustaceans, cnidarians, echinoderms, and tunicates, and is frequently accompanied by a change in nutrition or behaviour. Metamorphoses are animals that go through metamorphosis. Metamorphosis occurs in very few vertebrates, however it occurs in all amphibians to some extent.

The concentration of thyroxin in the blood, which drives metamorphosis, and prolactin, which inhibits it, govern metamorphosis in amphibians [2]. Specific events are determined by threshold levels for various tissues. Because most embryonic development occurs outside of the parental body, development is subject to several adjustments as a result of environmental factors. As a result, tadpoles can develop horny ridges for teeth, whiskers, and fins. They also utilise the lateral line organ. These organs become redundant after metamorphosis and are resorbed through regulated cell death, known as apoptosis [3]. The quantity of adaptation to specific ecological settings is astounding, and many new discoveries are being produced all the time. In frogs and toads, the newly hatched tadpole's external gills are covered with a gill sac after a few days, and lungs grow swiftly. Front legs form beneath the gill sac, and hindlegs appear a few days later. Following that, the tadpole normally goes through a lengthier stage in which it survives on a vegetarian diet. Tadpoles digest their food using a somewhat lengthy, spiralshaped stomach.

The amphibian larva is an unique morphological stage between the embryo and the adult. The larva is a self-contained embryo. While completing its embryonic development and growth, it must find food, escape predators, and participate in all facets of free-living existence [4]. Salamander and caecilian larvae are carnivorous, and their morphology is more similar to that of their adult forms than anuran larvae. Larval salamanders, which have four completely grown limbs, begin feeding on small aquatic invertebrates soon after emerging from their egg capsules. Tadpoles in anurans look like fish as they hatch. They have small, oval bodies and long, laterally compressed tails with a central axis of musculature and dorsal and ventral fins [5]. In frogs and toads, the newly hatched tadpole's external gills are covered with a gill sac after a few days, and lungs grow swiftly. Front legs form beneath the gill sac, and hindlegs appear a few days later. Following that, the tadpole normally goes through a lengthier stage in which it survives on a vegetarian diet.

Salamander larvae typically achieve full size in two to four months, while they can remain larvae for up to three years until metamorphosis. Some huge aquatic species, such as hellbenders and mud puppies, never entirely metamorphosis and remain larval as adults [6]. The length of tadpole development varies between species. Some anuran species develop and metamorphosis in two to three weeks in xeric settings, where ephemeral ponds may survive for only a few weeks; however, most species require at least two months. The urogenital system of all amphibians changes throughout metamorphosis. Many amphibians have a biphasic life cycle that begins with aquatic eggs and larvae and ends with terrestrial or semiaquatic juveniles and adults.

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