

# Eye of Newt

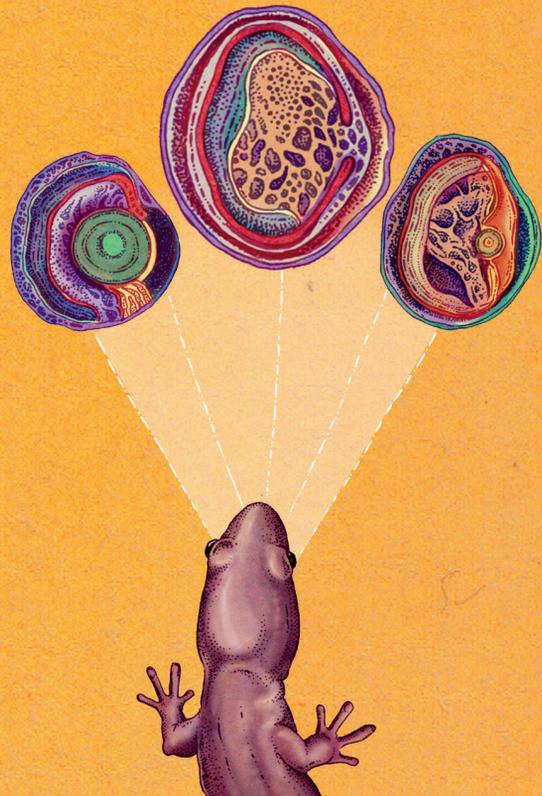
*A regenerating lens alters science time and time again*

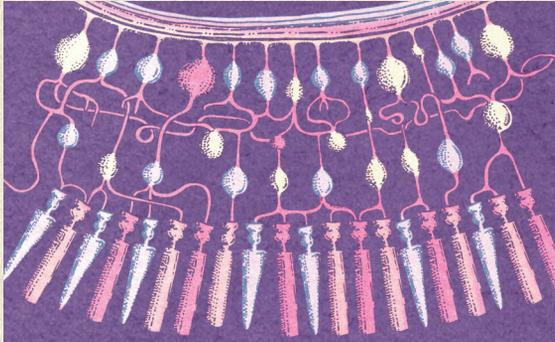
BY AMY MAXMEN ILLUSTRATIONS BY KATIE SCOTT



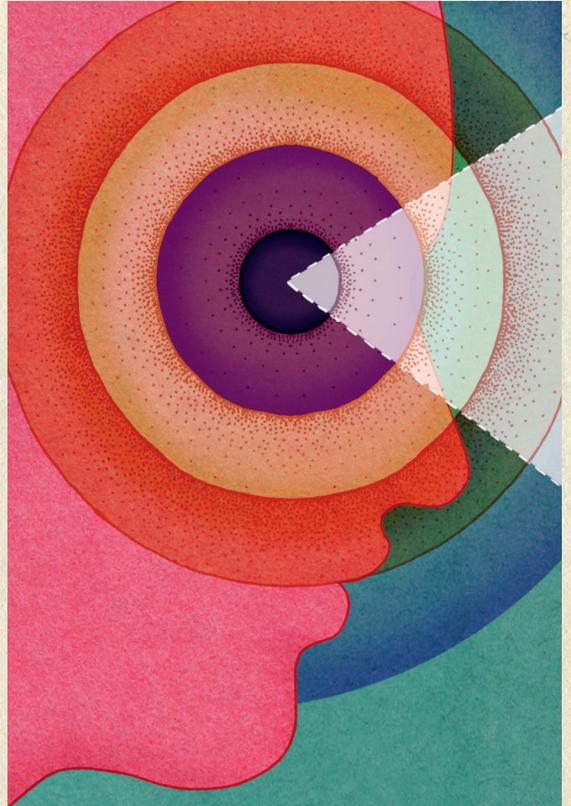
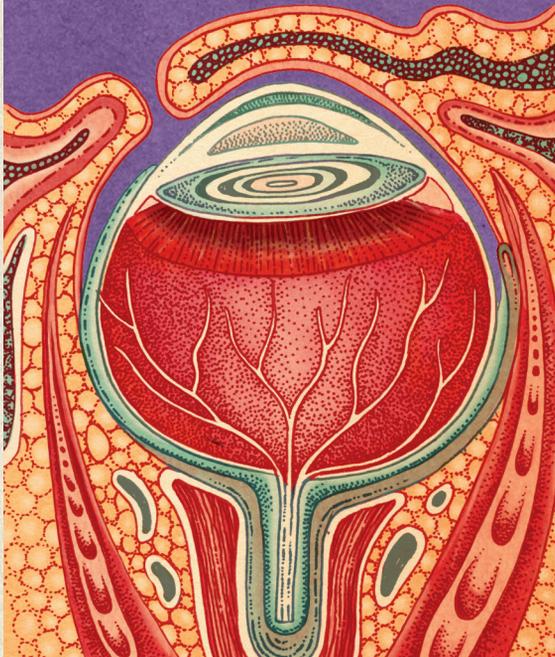
IN THE LATE 1700s, zoologists decapitated snails and sliced off salamanders' limbs, all to watch the parts regrow. Their meticulously illustrated observations clashed with the prevailing view of the time, called preformation, which held that animals exist in their current form before birth, simply unfolding as they grow. So-called materialists offered a competing theory, named epigenesis, in which body parts transform during development. That upset the establishment by according nature an autonomous power independent of God.

BY THE MID-1800s, preformation theories had faded, but salamanders continued to fascinate. After Darwin published his theory of evolution by natural selection, another biologist, Gustav Wolff, applied Darwin's ideas to newts. When Wolff removed the lenses in their eyes, they regenerated completely. If this capability were truly a product of "survival of the fittest," Wolff wondered why some salamanders and other animals couldn't do the same. He suggested that regeneration was an inherent characteristic, rather than a Darwinian adaptation molded by the environment.\*





**IN THE 1960s AND 1970s**, scientists in Japan removed salamander lenses, and studied how cells at the back of their eyeballs regressed into a “blank” state, reprogrammed, and transformed into glassy cells that aligned in geometrical arrangements to form a lens. If humans could reprogram cells like these creatures could, millions of people with degenerative eye disorders would see clearly.



**IN 2006**, cell biologist Shinya Yamanaka discovered a recipe for regeneration: Four genes could transform cells from human adults back to a nearly blank state. A few years after his finding, one of the biologists who had sliced salamander eyes in Japan, Panagiotis Tsonis, reported that salamanders use three of the same four genes when they regenerate their lenses. People therefore have the tools to rejuvenate eye parts, but somehow the ability is repressed. Now Tsonis wants to unlock our buried powers to begin again. ☺

\*A century after Wolff questioned the Darwinian nature of regenerating lenses, zoologists discovered why some salamanders and newts might be endowed with the adaptation whereas others are not. Parasitic worms frequently infect the eyes of those that regenerate, so the ability presumably allows them to see and survive.