Role of life's timekeeper—a novel theory of animal evolution

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This article presents a new theory of animal (metazoan) evolution, suggesting that it was partly mediated through a biochemical oscillator (cycler), named Life's Timekeeper, present in all animal cells. The cycler controls cell maintenance and repair, thereby determining how long cells survive (longevity). It originated in the single-celled ancestor of all animals, which had very short cell longevity. Animal evolution progressed by extending cell longevity, and this was mediated by extended cycle time of the oscillator. Multi-celled animals and cell-cell communication systems evolved later. The cycler controls the overall rate of development and aging, these time periods being proportionate to maximum cell longevity. Simple animals have cell rejuvenating abilities hence are potentially long lived, whereas complex animals lost such ability and have limited lifespan determined by the maximum potential longevity of their cells.

The theory suggests a two-tier model of animal evolution and so disputes modern interpretations of Darwin's theory, though probably remains compatible with Darwin's original hypothesis. The primary tier, mediated through extended cycle time, prolongs development, aging and hence lifespan of more advanced animals. Longer development enables more cell divisions during embryo formation, increasing the size of the body and the brain and enhancing behavioural and cognitive abilities. Over long periods there is a 'directional' trend towards slower cycles, longer lifespan, increased size and greater intelligence, as seen in the evolution of our species from a chimpanzee-like ancestor. The second tier arises mainly from random, non-directional changes in key

developmental genes. This makes minor changes affecting only part of an organism. It is responsible for the varied anatomical features of our recent ancestors, for example large nose and jaw in Neanderthals.

The theory has major implications for human embryology and aging. If the oscillator's cycle time could be extended in a fertilised human egg cell (zygote) this would result in development of a larger human with greater intelligence and extended lifespan. Slowing the cycle time across all cells in a nature adult would slow aging and extend life.

More information: David Neill, Individual Cell Longevity, 'Life's Timekeeper', and Metazoan Evolution, *Current Aging Science* (2016). DOI: 10.2174/1874609809666160114092340

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