

Review of: "On the Origin of Aging by Means of Natural Selection"

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Potential competing interests: No potential competing interests to declare.

REVIEW of: On the Origin of Aging by Means of Natural Selection by Richard F. Walker

Theodore C. Goldsmith

Darwin's 1859 book *On the Origin of Species* had two main subjects:

First was obviously the origin of species. Darwin proposed that current species were descended from earlier different species that were descended from still earlier species. This idea has been proved and proved again and there is no current significant scientific disagreement although there is still major religious opposition.

The second part concerned the evolution process and involved mutations and natural selection. As the article states, I have suggested that Darwin's concept plausibly fits at least 99 percent of the observations regarding design characteristics of living organisms. This concept explains why we have arms and legs, eyes and ears, and even eyebrows and fingernails because all of these design features plausibly increase an individual's ability to produce descendants. I say "plausibly" because in many cases it is not possible to prove individual benefit. Does the human appendix provide a benefit? Did it provide a benefit to some ancestor species?

However, even in 1859 there was an unresolved issue: How does aging in mammals and other multiparous sexually reproducing species increase an *individual's* ability to produce descendants. If aging actually reduces an individual's fitness, as shown by wild animal studies, why does aging exist in most multiparous species? There is still no wide scientific agreement on a solution to this problem despite more than 160 years of effort.

There are two main classes of attempts. Programmed aging theories suggest that aging produces a benefit for a *population* even though it is adverse as seen from an individual's viewpoint. They suggest that this led to the evolution of what amount to complex biological suicide mechanisms that cause aging and internally limit lifespan. Many such population benefits have been proposed. Non-programmed theories suggest that aging results in little or no negative impact on a wild population but does not produce an intrinsic benefit that would cause evolution of complex aging mechanisms. Mouse populations appear to thrive despite their short individual lifespans. Note that both classes violate Darwin's Individual benefit concept, but programmed aging is more obviously and dramatically in conflict.

A major and relevant scientific advance since Darwin is the whole science of genetics. The enormous detail that has been produced concerning biological inheritance supports the existence of programmed aging in multiple ways. In one

particular way, genetics discoveries show that the inheritance process involves transmission of information in *digital form* between parent and descendant of any organism. Consequently the evolution process is bound by the advantages and disadvantages of digital information transfer. The subject article would benefit from a discussion of these developments and their implications for the evolution process and the consequent nature of aging.