Annotated Bibliography

Topic: Biodemography of Human Ageing

Vaupel, J. W. (2010). Biodemography of human ageing. *Nature*, *464*(7288), 536–42. doi:10.1038/nature08984

I. The delay of human senescence and it’s potential drivers. How much of this can be attributed to better health, medical care, or other lifestyle changes, versus genetic variants within populations?

1. APOE gene
2. Variants that specifically increase longevity pro rare bc they reduce reproduction. How?
3. Inverse senescence- decline in mortality rate over the lifespan

II. Increase in morbidity

1. Possibly due to earlier diagnosis of late-onset diseases (i.e. diabetes, heart disease)
2. Decrease in disability reflect postponement of senescence
3. Health-Survival paradox: men seem to be healthier than women, but they die younger.

III. Causes of past and future postponement of senescence

1. Prosperity and medicine seem to be the two greatest factors for postponement
2. How does family structure, social networks, obesity impact health and longevity?

Shokhirev, M. N., & Johnson, A. A. (2014). Effects of extrinsic mortality on the evolution of aging: a stochastic modeling approach. *PloS One*, *9*(1), e86602. doi:10.1371/journal.pone.0086602

Classic vs. Nonclassic theories of senescence

Classic:

* Medawar’s “mutation accumulation”- extrinsic mortality is high in the wild, so that most animals won’t survive long enough to exhibit senescence, and the force of natural selection will decline with age, leading to an accumulation of late-acting deleterious mutations that lead to ageing.
* Williams’ “antagonistic pleiotropy” – senescence evolved due to selection for pleitropic genes, which are beneficial early in life, but deleterious later in life
* Kirkwood’s “disposable soma” – resources are often limited, and the force of selection declines with age, so individuals that invest more in reproduction, do so at the cost of “anti-ageing”mechanisms

In all 3:: extrinsic mortality is inversely related to lifespan::

Nonclassic: increased extrinsic mortality could select for increased longevity

Williams 1957: Pleitropy, Natural Selection and the Evolution of Senescence

* **Pleiotropy:** the production by a single gene of two or more apparently unrelated effects.
* Selection on a gene depends on the magnitude and timing of it’s effects
* Natural selection should be biased towards benefits early in life that might effectively increase reproduction (high fitness), even if those benefits have a later cost.
* Senescence begins as soon as reproductive maturation occurs
* Selective forces upon which the rate of senescence depends
  + Indirect selective force that acts to increase senescence because of pressure to increase vigor early in life, at the cost of vigor later in life
  + Direct selective pressure, which would act to reduce the “price”- acting to slow rate of senescence