

# Living fast but dying older is possible -- if you're a sheep

February 15 2011

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According to Dr Annette Baudisch of the Max Planck Institute for Demographic Research in Rostock, Germany, current methods of comparing patterns of ageing are limited because they confound two different elements of ageing – pace and shape.

"Some organisms live a short time, others live a long time. This is the pace of ageing. Short-lived species have a fast pace of ageing, and long-lived species have a slow pace of ageing. Pace describes how quickly the clock of life ticks away. For humans it ticks slowly, for small songbirds like the robin it ticks very fast," explains Dr Baudisch.

By contrast the shape of ageing describes how much mortality – the risk of dying – changes with [age](#). One way of measuring the shape of ageing is the 'ageing factor'. For example, the common swift has an ageing factor of 2, meaning mortality doubles during its adult life, compared with [modern humans](#), who have an ageing factor that exceeds 2000.

"At the age of 15, only 2 out of 100,000 girls in Sweden die, but one out of every two women aged 110 will die. This large difference in mortality at the beginning and end of adult life means that for humans the shape of ageing is steep, whereas in other species like the common swift it is shallow. And in some species the risk of death can even fall with age, with older individuals having the least risk of dying. This seems to be the case for the desert tortoise, and for alligators or crocodiles."

Using data for 10 different groups of animals from herring gull,

European robin, common swift and lake sturgeon to Dall mountain sheep, African buffalo, wild and captive chimpanzees, hunter-gatherers and modern humans (Swedish women), Dr Baudisch classified how each species aged in terms of pace and shape of ageing.

Of the species she analysed, Dr Baudisch found that although modern humans are the longest-lived, they also age most strongly.

Adult life expectancy for Swedish women (that is the remaining life expectancy after reaching maturity) is about 70 years, whereas a robin's adult life lasts just 1.7 years. But over that adult lifespan, ageing is so strong in the human that the ageing factor is 2132, but for the robin only about 2.

"Comparing robins with Swedish women, humans have a slow pace of ageing whereas the robin's is fast, so in terms of length of life the humans are doing best. But if we look at the impact ageing has on death rate the robin wins. Its shape of ageing is fairly flat whereas the humans' is steep, indicating that death rates increase markedly with age," she says.

Dr Baudisch's results have important implications for evolutionary biology and the study of ageing: "We need to compare species to understand how evolution has shaped the biology of ageing in different species, but current methods of comparing patterns of ageing across species are limited because they confound the pace and shape of ageing. Not accounting for this difference can lead to incorrect conclusions about which species age more than others."

"Separating pace from shape of ageing gives a clearer picture of the characteristics of ageing. It could reveal that certain species are very similar to each other in terms of their shape of ageing, species that we would maybe never have grouped together. Ultimately, this should help

us identify the determinants of ageing – the characteristics that determine whether death rates goes up or down with age and reveal species that can successfully avoid ageing," she says.

In more everyday terms, her results might make us re-think common expressions, such as "live fast, die young". As dying young in Dr Baudisch's terms corresponds to a small ageing factor and dying old to a large one, "live fast, die young" only applies to some short-lived species.

Robins live fast and die young, but even though Dall mountain sheep only live for around 4.2 years, their ageing factor is 7.

"Not all [species](#) with short lives live fast and die young. Robins do, but mountain sheep do things differently. They also live pretty fast but die older. From the data I have, it seems that live fast die young is only one option; you can also live fast and die older, or live slower and die young, or live slow and die old. There might be every combination in nature. That's something we need to find out in the future with better data."

**More information:** Annette Baudisch (2011), 'The pace and shape of ageing', [doi:10.1111/j.2041-210X.2010.00087.x](https://doi.org/10.1111/j.2041-210X.2010.00087.x) , is published in *Methods in Ecology and Evolution* on 15 February 2011.

Provided by Wiley

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