

# Research breakthrough on the question of life expectancy

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Why do we grow old and what can we do to stop it? This is the question asked by many, but it appears that we are now closer to an answer thanks to new research published by Monash University researcher Dr Damian Dowling.

According to the research published in the August edition of the prestigious journal, the [American Naturalist](#), a small set of genes in mitochondria (a membrane-enclosed organelle found in most [eukaryotic cells](#)), passed only from mothers to offspring, plays a more dynamic role in predicting life expectancies than ever previously anticipated.

The research discovered that particular mitochondrial haplotypes were

linked to the life expectancies of females in the beetle species *Callosobruchus maculatus*.

"What we found in these beetles that some combinations of mitochondrial and nuclear genomes confer long life in virgin females, but these are not the same combinations that result in long life in females that mate once, or in females that mate many times," Dr Dowling said.

"Clearly, the genetic determinants underlying life expectancies are complex.

"As we unravel this complexity, we draw closer to the day in which we might use the [genetic information](#) encoded in the mitochondria to assist in the development of therapies that slow the onset of ageing in humans," Dr Dowling said.

In animals, most of the [genetic material](#) that controls bodily functions is found inside the [cell nucleus](#). This is the nuclear genome - it is passed on from generation to generation through both mothers and fathers, and it encodes somewhere between 14 thousand and 40 thousand proteins.

However, a separate genome exists that is found only within the energy-producing factories of our cells - the mitochondria. To put things in perspective, the [mitochondrial genome](#) is tiny, encoding just 13 proteins. Despite being so small, it can pack a punch when it comes to its ability to affect a range of fundamental biological processes.

Dr Dowling, a research fellow at Monash University's School of Biological Sciences led the research together with Goran Arnqvist of Uppsala University Sweden and their student, Tejashwari Meerupati, made the discovery.

"Our findings are part of a much broader research agenda in which we

are elucidating the ways in which mitochondrial genomes have shaped our evolutionary past and present. What we are finding is that natural variation in this diminutive genome results in a huge range of effects on metabolism, mating behaviour and reproductive biology, including male fertility," Dr Dowling said.

"At the outset of our research program, we suspected that the evolutionary significance of the mitochondria had probably been underestimated by scientists that have come before us, but even we have been continually surprised by the magnitude and ubiquity of the effects that we have uncovered.

"We suspect that this genome still harbours many more secrets awaiting discovery," Dr Dowling said.

Provided by Monash University

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