

Progeny of old parents have fewer offspring

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Male house sparrow: any offspring of his produced at an older age will also produce fewer young. Credit: A.Sanchez-Tojar

Reproduction at old age involves risks that may impact one's own life and may impose reduced biological fitness on the offspring. Such evidence, previously obtained in humans and other taxa under laboratory conditions, has now been confirmed by researchers from the Max Planck Institute for Ornithology in Seewiesen together with colleagues from the UK and New Zealand for the first time in free-living animals. In a long-term study on a population of house sparrows they found that offspring of older parents themselves produced fewer young. Such a

transgenerational effect is important for the understanding of the evolution of longevity.

Fertility does not decrease in all taxa with increasing age but may remain constant lifelong as is the case of some invertebrates or may even increase with increasing age as in some reptiles. Generally both sexes are able to reproduce at old age, with males capable of producing more offspring than females. In some mammals such as humans male individuals remain fertile for a longer time compared to females that at some stage enter the menopause. However, reproducing at old age may incur risks such as a higher infant mortality or chromosomal anomalies. Moreover, children of old parents have themselves fewer offspring or have a shorter lifespan, which is commonly known as the "Lansing effect" that was demonstrated not only in humans but also in mice and some invertebrates in the laboratory but never in free living populations.

Julia Schroeder from the Max Planck Institute for Ornithology in Seewiesen has now investigated this effect in a population of [house sparrows](#) together with colleagues from the University of Sheffield and the University of Otago in New Zealand. Their study site is a small island off the coast of Devon in Southwestern England where the researchers have monitored and ringed the entire house sparrow population in the course of more than 10 years. The researchers took blood samples from the parents and their offspring in order to determine genetic parentage. That way they obtained a unique and detailed genetic pedigree of more than 5000 birds with a precise knowledge of the age and the number of offspring for each individual. Birds stayed the entire life on this remote island that is 19 km off the coast. During 12 years, only four sparrows could genetically not be assigned to parents living on the island, suggesting that these birds were immigrants. To test whether a possible effect is inherited or due to environmental factors entire clutches were systematically cross-fostered.

The analysis revealed a clear result. First, old mothers had a negative effect on the fitness of their daughters, meaning that these daughters produced fewer young. Similarly, older fathers produced sons that had fewer offspring. In particular, this has negative consequences for [offspring](#) that resulted from extra-pair matings, as a previous study has shown that house sparrow females seek extra-pair matings preferably with older males. Hence, according to the results of the present study, a female strategy to mate with viable males proves to be disadvantageous. "Thus, these results cannot be explained by changes of the environment but rather by the constitution of the parents, which changes with increasing age through epigenetic processes. This transgenerational age effect may change the selection pressure on longevity within a [population](#)", says Julia Schroeder, first author of the study. "The results are potentially important for breeding management programs of endangered species that often use old individuals from different populations to maintain genetic variability", adds the researcher.

More information: Reduced fitness in progeny from old parents in a natural population , *PNAS*

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