Environmental cues control reproductive timing and longevity

June 25 2009

When humans and animals delay reproduction because food or other resources are scarce, they may live longer to increase the impact of reproduction, according to a new study by University of Minnesota researchers published in the June 25 issue of *PLoS (Public Library of Science) One*.

The discovery, which explains why starvation can lead to longer life, has important implications for improving human health and lengthening lifespan.

The basic premise is that individuals use environmental cues to predict population declines, causing them to delay reproduction until the decline has occurred, when each offspring will make a bigger contribution to the gene pool. Conversely, if bad times turn to good times and the population is on the verge of a boom, reproducing sooner rather than later will help their genes thrive.

"If the population is decreasing, future kids make a bigger splash in the gene pool than current kids," explains Will Ratcliff, a College of Biological Sciences graduate student who came up with the idea for the study. "So, if there are tradeoffs between current and future reproduction, delaying reproduction can be a good idea, even if it reduces the number of kids you have during your lifetime."

Fluctuations in testosterone levels provide an example of how the environment and organisms interact to guide reproduction, explains R.

Ford Denison, adjunct professor in the College of Biological Sciences and Ratcliff's adviser. Testosterone suppresses the immune system. So when environmental conditions trigger high levels, reproduction is high but longevity drops.

Environmental factors also control the age of menarche. In African countries with chronic food shortages, girls experience menarche much later than in the U.S., where rich diets trigger early menarche. Food scarcity is a signal that population is likely to decline, so reproduction is delayed, while an abundance of rich food signals an increase, causing reproductive age to drop.

"Our hypothesis may explain hormesis, the mysterious health benefits of low doses of toxins - including those that plants like broccoli make to defend themselves from insects," says Denison. " When their usual foods are scarce, organisms turn to plants containing chemicals that can suppress reproduction and consequently increase longevity "These toxins may be abundant in 'famine foods' that are eaten only when meat and fruit are not available" Denison adds.

Source: University of Minnesota (news : web)

Citation: Environmental cues control reproductive timing and longevity (2009, June 25) retrieved 2 May 2024 from
https://phys.org/news/2009-06-environmental-cues-reproductive-longevity.html