Rhesus macaques compensate for reproductive delay following ecological adversity early in life

Logan Luevano[1], Chris Sutherland[2], and Raisa Hernández-Pacheco[1]

[1]California State University Long Beach
[2]University of St Andrews

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Abstract

Adversity early in life can shape the reproductive potential of individuals through negative effects on health and lifespan. However, long-lived populations with multiple reproductive events may present alternative life history strategies to optimize reproductive schedules and compensate for shorter lifespans when experiencing adversities early in life. Here, we quantify the effects of major hurricanes and density-dependence as sources of early-life ecological adversity on the mean age-specific fertility, reproductive pace, and lifetime reproductive success (LRS) of Cayo Santiago rhesus macaque females, and explored demographic mechanisms for reproductive schedule optimization later in life. Females experiencing major hurricanes early in life exhibit a delayed reproductive debut, but maintain inter-birth intervals and show a higher mean fertility during prime reproductive ages relative to females experiencing no hurricanes. Increasing density at birth is associated to a decrease in mean fertility and LRS. When combined, our study reveals that early-life ecological adversities predict a delay-overshoot pattern in mean age-specific fertility that supports the maintenance of LRS. In contrast to predictive adaptive response models of accelerated reproduction, the long-lived Cayo Santiago population presents a novel reproductive strategy where females who experience major natural disasters early in life ultimately overcome their initial reproductive penalty with no overall negative fitness outcomes. Such strategy suggests that investing more energy into development and maintenance at younger ages allows long-lived females experiencing early-life ecological adversity to reproduce at a mean rate equivalent to that of a typical female cohort later in life.

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