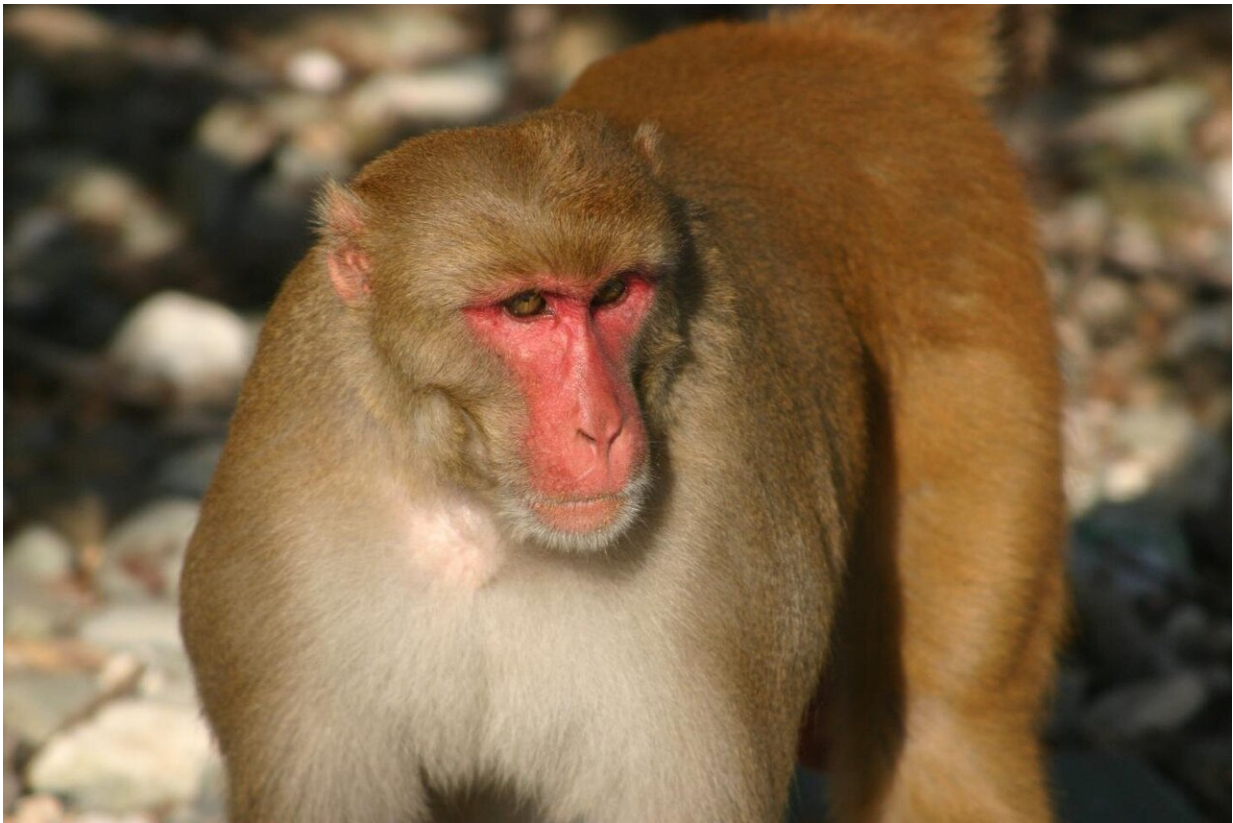


Monkeying around: Study finds older primates father far fewer babies

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One of the free-ranging rhesus macaques on Cayo Santiago, Puerto Rico. Credit: Krista Milich, Washington University in St. Louis

Infertility is a worldwide clinical problem for human health that affects 8 to 12 percent of couples. A new study from Washington University in

St. Louis has implications for understanding some age-related aspects of male reproductive health in primates, including humans.

Older male rhesus monkeys sire fewer [offspring](#), even though they appear to be mating as much as younger monkeys with similarly high social status. Sperm quality or quantity, or the survival of infants, may decline with the age of the would-be father, the new study suggests.

Researchers tracking a colony of free-ranging rhesus macaques in Puerto Rico reported their findings Aug. 3 in the journal *Scientific Reports*.

"There have been a number of studies that explore female reproductive senescence in humans and other primates, but comparatively little work on male reproductive senescence," said Krista Milich, assistant professor of biological anthropology in Arts & Sciences.

"In fact, male reproductive success is thought to be primarily impacted by access to fertile females, but in this paper, we challenge that assumption."

About the study

Cayo Santiago is a small primate research island in Puerto Rico. It is home to a colony of rhesus macaques that was established in 1938 with approximately 400 wild-caught animals from India. At the time of this study, more than 1,200 monkeys lived on the island.

Researchers followed 21 [adult males](#)—the highest ranking individuals in their social groups—through breeding and birth seasons in a single year. All babies born that year were genotyped to determine both maternal and paternal lineage.

"We found that older, high-ranking males who were mating with females

and who we would normally expect to produce a lot of offspring in a given mating season were actually producing very few or no offspring," Milich said.

"These are males that we know sired many offspring in their younger years, based on genetic records," she said. "We know from our behavioral data that they had access to mating partners at rates that were similar to or even higher than other males of similar social status.

"Yet, they were producing far fewer offspring than would be expected given their mating effort—and fewer offspring than similarly ranked males that were younger."

Their conclusion: Age brings fertility or mortality issues.

"These findings provide evidence of post-copulatory reproductive senescence—in other words, the [sperm quality](#) or quantity or infant survival may decline with age [of the male]," Milich said.

Who's your daddy?

At Washington University, Milich leads the Reproductive Ecology and Behavioral Endocrinology Laboratory (REBEL). She and her research team members use ecological, behavioral, hormonal and genetic data to investigate certain long-held beliefs within the areas of sexual selection and sexual strategies.

This new research can help fill a number of important gaps in understanding reproductive success in primates, Milich said.

First, most research on aging and infertility in humans has focused on women.

In addition, while some studies on age-related changes to men's sperm have been conducted, they provide contradictory evidence. And cross-cultural variations make the issues of aging and reproductive success difficult to understand through human studies.

In other studies with different monkey species, declines in reproductive output for older males have been associated with a loss of dominance status, loss in attractiveness, and/or loss in body condition leading to a decline in mating activity.

But the older rhesus monkeys in this study maintained high rates of mating behaviors while still experiencing the same decline in reproductive output.

"In populations where individuals are successfully mating and producing offspring, researchers should not use behavioral observations of [mating](#) patterns to determine paternity," Milich said. "As we saw in this study, those data do not necessarily match with the genetic paternity data."

Conservation implications

Future studies should continue to gather long-term data on variation in male reproductive health, and how social and physiological factors can impact a male's ability to sire offspring, said the study authors. Milich was joined by Angelina Ruiz-Lambides and Elizabeth Maldonado of the University of Puerto Rico plus Dario Maestriperi of the University of Chicago.

"Unfortunately, we have reached a level of deforestation and habitat destruction that impairs successful reproduction within some populations of wild animals," Milich said.

"In efforts to try to understand why certain populations have not been

successful at producing any infants for years, sometimes even over a decade, researchers should take into consideration not only the age and stressors to females, but also the age of males," she said.

More information: Krista M. Milich et al, Age negatively impacts reproduction in high-ranking male rhesus macaques on Cayo Santiago, Puerto Rico, *Scientific Reports* (2020). [DOI: 10.1038/s41598-020-69922-y](https://doi.org/10.1038/s41598-020-69922-y)

Provided by Washington University in St. Louis

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