

Polygamy hurt 19th century Mormon wives' evolutionary fitness

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This is an illustration from from "The Women of Mormonism or the Story of Polygamy as Told by the Victims Themselves," by Jennie Anderson Froiseth (1882). Credit: Courtesy of the IU Lilly Library

Polygamy practiced by some 19th century Mormon men had the curious effect of suppressing the overall offspring numbers of Mormon women in plural marriages, say scientists from Indiana University Bloomington and three other institutions in the March 2011 issue of *Evolution and Human Behavior*.

Simply put, the more sister-wives a Mormon woman had, the fewer children she was likely to produce.

"Although it's great in terms of number of children for successful males to have harems, the data show that for every new woman added to a

male's household, the number each wife produced goes down by one child or so," said IU Bloomington [evolutionary biologist](#) Michael Wade, whose theoretical work guided the study. "This regression is known as a 'Bateman gradient,' named after the geneticist who first observed a similar phenomenon in fruit flies."

The paper's coauthors were Jeffrey Moorad (Duke University, Indiana University Ph.D. 2005), Daniel Promislow (University of Georgia), and Ken Smith (University of Utah).

The researchers' survey of birth, marriage and death records from the Utah Population Database covers nearly 186,000 Utah adults and their 630,000 children who lived or died between 1830 and 1894. This period marked an important transition for the nascent Mormon Church, as polygamy began to be phased out in deference to U.S. laws banning the practice but also via internal pressure from the Mormons themselves.

The scientists' study confirmed their expectation that a moratorium on Mormon polygamy would have the effect of decreasing the intensity of sexual selection among males and ultimately bringing the strength of reproductive selection on men closer to that acting on women. With fewer polygamous marriages, more males had access to wives, which led to a decrease in the variation in Mormon males' mating and reproductive success. The scientists estimate that ending polygamy reduced the strength of sexual selection on males by 58 percent.

"This study was very exciting for us, in large part because you just don't get to see the demographic effects of dramatically changing a mating system within a single population -- in any organism," Wade said. "It's an added bonus that this change from polygamy to monogamy just happened to involve people who kept such thorough records of the marriages, births and deaths at that time."

Wade, who specializes in the evolutionary biology of mating systems, says much of his work has elucidated and expanded on the ideas of Angus Bateman. Bateman, a prolific theorist, was unable to empirically test all his theories about mating and mating fitness before he died in 1996. Last year Wade and Northern Arizona University biologist Stephen Shuster co-wrote a retrospective on a classic paper Bateman wrote for the journal *Heredity* in 1948. Wade and Shuster extolled Bateman's vision, in particular the way in which Bateman thought sexual selection should be quantified. Bateman's critics thought his reductions of biology were too simplistic, yet Wade says Bateman's simple formulas are often dead-on.



This is a homestead of Joseph Smith, founder of the Mormon church. Credit: Church of Latter-Day Saints

"Bateman's ideas still are very much alive, the present study included," Wade said. "It was also his idea that selection could be stronger on males than on females, that what can be an advantage to males can be a disadvantage to females of the same species. And the advantage isn't just in having more mates. You may simply produce more offspring, than the average, if you're a male successful in reproductive competition against other males."

Which isn't to say systems of polygamy in humans or elsewhere in nature

are necessarily good for all the males involved. Indeed, Wade says, polygamy is a bad thing for most males of a species.

"When the ratio of sexes is about equal, for every male that has three mates, there must be two males that have none," Wade said. "If a male has even more mates, then the disparity among male 'reproductive' haves and have-nots can become quite great."

So if polygamy (or the female equivalent, polyandry) is disadvantageous to most of the sequestered sex and most of the mate-sequestering sex, why should such systems survive?

"The complete answer is still forthcoming," Wade said. "One thing we know now, based on rigorous studies in many species, particularly the fruit fly, is that selection can be so strong on males that it can drag the entire species off of a naturally selected viability optimum."

Wade points to a familiar example.

"Take the peacock," Wade said. "Its tail is magnificent for attracting females and bad for attracting predators. It is believed that in some situations there is a "predator hard cap" on the fitness of sexual characteristics. But there's also research suggesting even the predator hard cap can be overpowered if [sexual selection](#) on males is strong enough. That is, males trade high risks to their lives in order to gain large numbers of mates and thereby offspring."

More information: "Mating system change reduces the strength of sexual selection in an American frontier population of the 19th century," *Evolution & Human Behavior*, vol. 32, iss. 2, pp. 79-156 (March 2011)

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