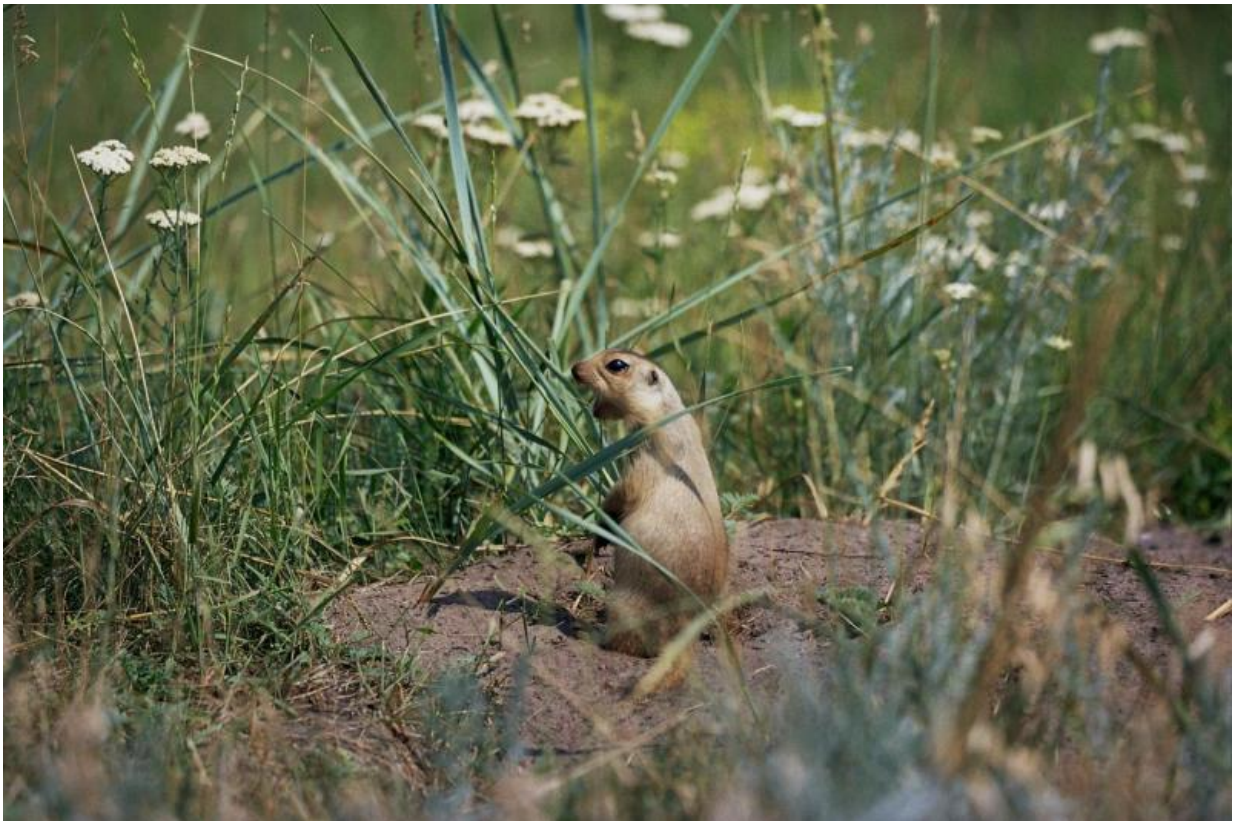


Instance of female reproductive failure due to shortage of males found in squirrels

October 5 2015, by Bob Yirka



Alarm calls (yellow ground squirrel). Credit: Nikita Vasiliev

(Phys.org)—A pair of researchers with the Russian Academy of Sciences has found an instance of female reproductive failure that was due to a shortage of males—and because of that, a large percentage of

yellow ground squirrels living near the Russian village of Dyakovka did not to get pregnant each year. In their paper published in the journal *Science Advances*, Nina Vasilieva and Andrey Tchabovsky describe their four year study of the little rodents and why their results suggest that traditional theories regarding females as the major factor in reproductive failure in a species, may have to be altered.

Classic sexual selection theory suggests that female reproductive success in a species is supposed to be independent of the number of available male mates, which differs markedly from the male point of view. But now that theory is being challenged by the research duo in Russia—they note that reproductive failure due to a shortage of [males](#) has been found in spiders, fish and insects, but not in mammals, until now.

Over the four year study, the researchers studied a group of the [squirrels](#) in their natural environment—it is cold there and the squirrels hibernate for approximately nine months each year, each alone in a separate burrow. With most hibernating species, females emerge before the males—not so with the yellow ground squirrel—the researchers found that males emerged on average 11 days earlier than the females. They also found that the female squirrels were only receptive to mating for a few days after emerging, a very short window of opportunity for males looking to find them—the mating season for all of the squirrels in a given area was just a couple of weeks. Furthermore the researchers found no indication that the rate of female impregnation in any give season was related to her physical condition, including her age or previous number of impregnations. They noted also that because the females do not all emerge at the same time, initially there were more males around than females, but that ratio turned around as more females emerged, leading to a shortage of males.

The team reports that 30 to 40 percent of the [females](#) studied, failed to reproduce each year. They suggest their findings likely apply to other

species as well, which indicates that classical theory regarding female reproductive success, may have to be rewritten.

More information: A shortage of males causes female reproductive failure in yellow ground squirrels, *Science Advances* 02 Oct 2015: Vol. 1, no. 9, e1500401. [DOI: 10.1126/sciadv.1500401](https://doi.org/10.1126/sciadv.1500401)

Abstract

Sexual conflict theory suggests that female breeding success is strongly influenced by individual life history and environmental conditions and is much less affected by mate availability. Female mating failure due to a shortage of males remains poorly studied and understood. We present data on the effects of male availability on female breeding success in a wild colony of yellow ground squirrels (*Spermophilus fulvus*). A female's probability of breeding increased with the local density of males and was higher with higher male-biased operational sex ratio (OSR) but was independent of local female density, female age, and body condition, which are factors commonly assumed to influence female reproduction. The positive effect of male availability (as measured by OSR) on female breeding success was consistent across the years, and we conclude that male limitation contributes to female mating failure. This pattern, which is not commonly recorded in species with conventional sex roles, can be explained by a combination of sociodemographic and life history traits (sex differences in age of maturation, female-skewed adult sex ratio and seasonally varying OSR, solitary living at low population density, and low mobility of females combined with mate-searching tactics of males) that are not confined to *S. fulvus*. Our findings indicate that the role of female mating failure (due to a shortage of males) in shaping mammalian life history may be underestimated.

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