

Harem-holding male primates fail to rise to the challenge

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Harem-holding gelada baboons in the Simien Mountains National Park failed to rise to the challenge of the takeover season. Credit: A. Davey licensed under CCBY2.0

Today the Royal Society launches a new open access, objective peer reviewed journal, *Royal Society Open Science*. In one of the studies published in the new journal, scientists add complexity to an accepted hypothesis of how hormone levels change in competing males.

For the last 25 years the 'challenge hypothesis' has been widely accepted as an explanation of how [hormone levels](#) respond to social challenges in males from bird species to primates. The researchers behind this study

of [testosterone](#) in wild gelada primates highlight that there are limits to the original hypothesis and that the real relationship between testosterone [levels](#) and behaviour might be more complicated than first appears.

The team studied a group of wild gelada in the Simien Mountains National Park, Ethiopia. These primates fight each other for harems of female gelada with whom the victor mates. From February to June each year the 'takeover season' occurs when bachelor males challenge current harem-holders. To analyse patterns in the testosterone levels of these primates the team sampled faecal matter from 133 males around once a month across six years.

The results revealed that although overall throughout the year harem-holding males had higher levels of testosterone than bachelor geladas, during the annual takeover season bachelors' had the highest levels of testosterone. During the week when takeover contests were mounted, both the current harem-holders and the would-be-leaders had increased levels of testosterone with harem-holders boosting their levels of testosterone in response to the threat of immediate challenges. The team say these results show that although harem-holding males were responding to contests they 'did not rise to the challenge exactly when needed most.'

The researchers say that one explanation could be that after a long dry season leading males are simply unable to maintain very high levels of testosterone, which are energetically costly, throughout the takeover season. The researchers found that the levels in harem holders followed the same pattern as seasonal rainfall coming to a peak at the end of the wet season which could be explained by a switch in diet from grass during the wet season to foraging for corms below ground in dry conditions, creating an energy shortfall.

Bachelor [males](#) may be able to offset this shortfall as they don't spend

energy guarding females and by travelling in smaller groups they may be able to travel less to get sufficient nutrients. In fact the team found that instead of following rainfall patterns the [testosterone levels](#) of bachelor geladas peaked twice, once at the same time as the harem holders and also during the takeover season.

'Really the most interesting story for geladas emerges when we examine the bachelors and leaders separately,' say the team. 'Not only does the testosterone of challenging bachelors predict their future status (with higher testosterone characterising the bachelors that eventually take over harems) but also the testosterone differential between leaders and bachelors predicts the unusual spike in takeovers at the end of the dry season.'

More information: "Harem-holding males do not rise to the challenge: androgens respond to social but not to seasonal challenges in wild geladas." David J. Pappano, Jacinta C. Beehner *Royal Society Open Science*, [DOI: 10.1098/rsos.140081](https://doi.org/10.1098/rsos.140081) Published 23 September 2014.

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