

Conflict between the sexes maintains diversity in brain hormones

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Men are from mars and women are from venus? While this stereotype is extreme and controversial, gender differences in behaviour nonetheless are common in nature. Much variation in animal, including human, behaviour is regulated by expression of hormones and their receptors in brains.

For some animals, differences in the expression of vasopressin receptor 1a (Avpr1a) and oxytocin receptor (Oxtr) generates diversity in social and sexual behaviour; in humans, [genetic differences](#) at the gene for Avpr1a have been associated with [marital problems](#). What is not clear, however, is why should the behaviour of individuals differ? And, if one type of behaviour is beneficial then why don't all individuals express that [behaviour](#)?

A study published in *Proceedings of the National Academy of Sciences (PNAS)* asks the question: what mechanisms might maintain genetic differences in Avpr1a and Oxtr? The authors determined how genetic differences at these two genes associated with [sexual behaviour](#) affected the reproductive success (how many pups were born) of a small rodent, the bank vole *Myodes glareolus*.

The main result of the study was that the 'beneficial' genetic variants (alleles) at the vasopressin and oxytocin receptor genes depend on gender: in other word, alleles that are beneficial to the [reproductive success](#) of females are detrimental to success of males, and vice versa – this apparent conflict of interest between sexes is termed 'sexually

antagonistic selection'. Interestingly, the pattern of sexual conflict depended upon the social environment (the density of individuals). Changes in density of individuals, in space and time, often occur in nature, and this might be another important mechanism maintaining genetic and behavioural variation.

In the case of vasopressin and oxytocin receptors, there is a constant 'battle' to find a genetic optima, with diversity is maintained as no single optimal genetic variant (allele) for both sexes exists, and this is further complicated by environment change! While male and female bank voles do not come from different planets, they illustrate a potential 'genetic battle' that can happen as the sexes share the same genome but can nonetheless favour different behaviors.

Many behaviours are regulated by vasopressin and [oxytocin receptor](#) in other mammals and in humans. The new research raises an interesting question: is the evolution of our brains also regulated by a conflict between sexes?

More information: Eija Lonn et al. Balancing selection maintains polymorphisms at neurogenetic loci in field experiments, *Proceedings of the National Academy of Sciences* (2017). [DOI: 10.1073/pnas.1621228114](#)

Provided by University of Jyväskylä

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