Rewritable Fidelity: How Monogamous Pair Bonds are Affected by a History of Previous Bonding Experience in the Prairie Vole (Microtus ochrogaster)

**BACKGROUND**

Social monogamy is a fundamental aspect of the human condition whereby males and females undergo attachment. Reproduction and social behavior are based on a flexible physiological foundation which can accommodate life experience.

The prairie vole provides an optimal model of social monogamy within which it is possible to examine the biological underpinning of attachment. Social monogamy is defined as a mating strategy in which one breeding female and one breeding male closely associate with one another over several breeding seasons. It is hypothesized that social monogamy evolved due to the male's inability to defend and monopolize multiple females. Socially monogamous behavior is physiologically regulated by neuropeptides, such as oxytocin and vasopressin, as well as other biological mechanisms. Furthermore, it has been implicated that interactions between these neuropeptides lead to partner preference and stranger aggression behaviors.

Using the prairie vole model, we investigated the male capacity to form multiple pair bonds with new females over several pairings as well as the fidelity of those males to their mates compared with a novel, inexperienced female. Repeated pairings and pair bond dissolution is meant to model the aging and resilience of brain systems that regulate social attachment.

**METHODS**

Partner preference was tested by placing male voles in the center chamber, with their female partners tethered in one chamber and an unknown stranger female tethered in the other. Males were tested with their first female mate, their fifth female mate, and their tenth female mate.

Males remained with each mate for 3 weeks (the length of a single gestation in voles), at which time females were removed. Males remained isolated for 1-2 weeks following the dissolution of each pair.

**PARTNER PREFERENCE**

Male preference for partner and stranger females declines over 10 pairings.

**TOTAL CONTACT TIME**

Male preference for total female contact time declines over 10 pairings.

**SUMMARY**

- Our data suggest that prairie voles display a limited capacity for rewritable fidelity, as exemplified by the declining time spent with familiar female mates over several breeding generations.

- In the future, we hope to use an open field test as well as a water maze in order to investigate the frequency of both depression and anxiety behaviors in male prairie voles.

- Additionally, we hope to conduct receptor autoradiography experiments with the aim of studying the distribution and function of neurotransmitter receptors as well as epigenetic analysis in order to investigate the neurobiological foundation of these behavior patterns.

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References
