

First brain-wide map shows how sex and intimacy rewire the brain

February 22 2024



Pair of prairie voles. Credit: Aubrey Kelly

How does sex relate to lasting love? To answer that question, scientists have long studied a small Midwestern rodent called the prairie vole, one of the few mammals known to form long-term, monogamous

relationships.

A team of researchers, including Steven Phelps at The University of Texas at Austin, has created the first brain-wide map of regions that are active in [prairie voles](#) during mating and pair bonding. The researchers found that bonding voles experience a storm of [brain activity](#) distributed across 68 distinct [brain regions](#) that make up seven brain-wide circuits. The brain activity correlates with three stages of behavior: mating, bonding, and the emergence of a stable, enduring bond.

Most of these brain regions the researchers identified were not previously associated with bonding, so the map reveals new places to look in the human brain to understand how we form and maintain close relationships.

Earlier studies concluded that male and female brains often use fundamentally different mechanisms to produce the same behaviors, such as mating and nurturing offspring. But in this study, bonding males and females had nearly identical patterns of brain activity.

"That was a surprise," said Phelps, a professor of integrative biology at UT Austin and senior author of the [new study](#) in the journal *eLife*. "Sex hormones like testosterone, estrogen and progesterone are important for sexual, aggressive and parental behaviors, so the prevailing hypothesis was that brain activity during mating and bonding would also be different between the sexes."

Compared with humans, prairie voles have whirlwind courtships. Within half an hour of being together, a male and female begin to have sex, and they will do so repeatedly, often many times an hour. Within a day, their amorousness will lead the pair to form a bond that can last a lifetime. Bonded pairs will groom each other, console each other when stressed, defend their shared territory, and rear their young together.

The researchers were able to pinpoint with high resolution which brain cells were active in vole brains at various points over the course of the process that leads to and includes bonding. This is the first time such a method has been applied to prairie voles. By studying more than 200 prairie voles across multiple times during mating and bonding, the researchers produced an unprecedented and foundational data set.

The strongest predictor of activity across the 68 brain regions that the researchers identified surprised them. It was male ejaculation, suggesting the experience elicits a profound emotional state—and not only in the affected males. Females, too, had more bonding-related brain activity with males who reached that milestone.

"The brain and behavior data suggest that both sexes may be having orgasm-like responses, and these 'orgasms' coordinate the formation of a bond," Phelps said. "If true, it would imply that orgasms can serve as a means to promote connection, as has long been suggested in humans."

Phelps cautioned that it's impossible to know whether a female prairie vole is having an orgasm simply by watching its [sexual behavior](#), though previous research has found that some female animals, such as monkeys, have these physiological responses.

In addition to Phelps, the study's co-authors are Morgan Gustison, a former postdoctoral researcher at UT Austin now at the University of Western Ontario, Rodrigo Muñoz-Castañeda at Weill Cornell Medicine, and Pavel Osten at Cold Spring Harbor Laboratory.

More information: Morgan L Gustison et al, Sexual coordination in a whole-brain map of prairie vole pair bonding, *eLife* (2024). [DOI: 10.7554/eLife.87029.3](https://doi.org/10.7554/eLife.87029.3)

Provided by University of Texas at Austin

Citation: First brain-wide map shows how sex and intimacy rewire the brain (2024, February 22)
retrieved 27 April 2024 from

<https://medicalxpress.com/news/2024-02-brain-wide-sex-intimacy-rewire.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.