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From the Los Angeles Times

## Does this explain muskrat love?

**Male rodents bonding with a mate produce a loyalty brain chemical that leads to depression during times of separation, a study finds. The research may help in the treatment of human grief.**

By Denise Gellene  
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Scientists have confirmed what poets have long known: Absence makes the heart grow fonder.

Working with mouse-like rodents called prairie voles, scientists have found that close monogamous relationships alter the chemistry of the brain, fostering the release of a compound that builds loyalty but also plays a role in depression during times of separation.

The scientists found that after four days away from their mates, male voles experienced changes in the emotional center of their brains, causing them to become unresponsive and lethargic. When given a drug that blocked the changes, however, lonely voles emerged from their funk.

The same chemical is found in human brains, and scientists said the research could provide insight into treating human grief and separation.

"Whenever you form a pair bond, it changes your neurochemistry," said Larry J. Young, a neuroscientist at Emory University in Atlanta and an author of the study. "If you lose that partner, it has a dramatic impact on the brain."

Experts noted that human relationships are more complex than animal bonds and involve culture, socialization and rational thought. Thus, there may be little to learn from the depressed voles.

"When humans grieve they don't just give up and sit like lumps," George Bonanno, a psychologist at Columbia University's Teachers College who studies the process of bereavement. "They have purposeful behavior even when they are feeling lousy."

Still, Young said the experiment might help explain the longing people feel for partners who are absent or who die. The study, published Wednesday in the journal *Neuropsychopharmacology*, might also shed light on why couples remain in relationships that are bad for them, he said.

Prairie voles, which are found in the wild through much of North America, are used to study monogamy because they are among the few animals that pair up like humans. Although the voles may occasionally stray from the nest, they eventually return to their lifelong partners to help raise litter after litter.

The brain chemical corticotropin-releasing factor, or CRF, has a key role in maintaining those loyal bonds, researchers found.

After separating nine male voles from their partners, Young and colleagues from Emory and the University of Regensburg in Germany tested the animals' ability to cope with stress.

When placed in a pool of water, the voles passively floated instead of trying to swim. In a second test, the animals failed to struggle when suspended by their tails.

The animals displayed "depressive behaviors," Young said. "They become more passive, more likely to give up."

When researchers killed the voles and looked inside their brains, they found elevated levels of CRF, which is known to have a role in depression.

A control group of 10 male voles that had been separated from a male sibling displayed no depressive behaviors or increases in CRF, researchers said, indicating there was something special about monogamous bonds.

Voles that received a drug that blocked CRF behaved normally when separated from their female mates, according to the study, which was funded by the National Institutes of Health, and other research organizations and foundations.

Several pharmaceutical companies are developing drugs that act on CRF as treatments for depression and anxiety-related disorders.

In some cases, researchers said, the pain of separation can serve a useful purpose. Young said uneasy feelings that come with separation may keep males close to their nests, where they can protect offspring from predators, for example.

C. Sue Carter, a professor of psychiatry at the University of Illinois at Chicago who works with voles, cautioned against anthropomorphizing the animals, adding there is more than one way to interpret their behavior.

"What humans call depression might be an adaptive strategy," she said. The passive voles might simply be conserving their energy for more important things, she suggested, such as searching for a new mate.

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