

Prairie voles pair up

SCIENTIFIC NAME

Microtus ochrogaster

TAXONOMY

PHYLUM: Chordata

CLASS: Mammalia

ORDER: Rodentia

FAMILY: Cricetidae

Physical description

Prairie voles are hamster-sized rodents with small ears and eyes and a short tail. Their coarse fur is grayish brown on the back but yellowish on the belly. The scientific name is derived from Greek and is quite descriptive, with the genus name translating roughly to 'small ear' and the species epithet to 'yellow belly.' They show no sexual dimorphism with respect to size or coloration, with adults measuring 125–180 mm in length and weighing 30–70 g. In captivity, they may live for 1–3 y and produce several litters per year.



Kahle Vicari

Behavior

Unlike other voles, prairie voles are largely monogamous and form strong pair bonds. The male prairie vole remains with the female after breeding, and they share a nest, groom each other and engage in other affiliative behaviors. Both adults also participate in raising pups.

Research résumé

Several studies have explored the biological basis of the voles' unusual bonding. By comparing expression of neuropeptides and neurotransmitters in prairie voles and in montane voles, their 'promiscuous' congenic relatives, scientists discovered remarkable species differences in the distribution and density of arginine vasopressin, oxytocin and dopamine receptors within the brain¹. In prairie voles, the receptors are concentrated in areas of the brain involved in reward circuitry², such as the nucleus accumbens. The results suggest that expression of these receptors facilitates affiliation and social attachment in monogamous voles by modulating reward pathways. More recently, differences in expression of μ -opioid receptors between prairie voles and promiscuous meadow voles also have been identified and suggested to contribute to the behavioral differences between the species^{3,4}.

The prairie vole's social behavior makes it a useful model for studying pair bonding and partner preference. To enable more in-depth

studies of the genetic underpinnings of these and other aspects of prairie vole behavior, researchers developed a bacterial artificial chromosome library, a prairie vole-mouse comparative cytogenetic map and a genome-wide linkage map for the prairie vole genome^{5,6}. Several genes involved in regulating vole behavior have also been recently sequenced, including those that encode arginine vasopressin, oxytocin, dopamine and their respective receptors⁷.

Because pair-bonding occurs only after mating, researchers have speculated that epigenetic factors are at play. This suspected involvement was recently confirmed by results from a study in which sexually naive female voles were housed with males for a brief period but did not mate⁸. Inhibition of epigenetic modification in the

brains of females resulted in transcription of arginine vasopressin and oxytocin receptors, much like mating did, confirming the link between epigenetic modification and pair-bonding.

Continued work could lead to a better understanding of how epigenetics affects social behavior in other species.

Prairie voles may be best known for pair-bonding and social attachment behavior, but they also have been proposed as potential models for disorders of social cognition and interaction, including conditions such as autism and schizophrenia⁹. Although studies of social behavior in prairie voles are not expected to identify clear mechanisms for these disorders, their results may help to pinpoint the genetic pathways and neurobiological systems that regulate aspects of social behavior that are affected.

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