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Ophir and his colleagues set out to study the variations in neural V1aR in determining the sexual fidelity and territory of *Microtus ochrogaster*, commonly known as the prairie vole (1). Their results showed that young pair-bonded male voles held a stronger V1aR expression in the posterior cingulate/retrosplenial cortex (PCing) and laterodorsal thalamus (LDThal) regions, which are associated with spatial memory, space use, and paternity. However, their experiment did not include the full behavioral social cycle seen in the prairie voles breeding lifespan.

Prairie voles partake in three main social lifestyles: communal living, wanderer, and pair bond. Communal groups are usually made from extended families of male-female pairs or single females and are 69% of the social lifestyles with 68% of male and 73% of female adult offspring staying in their natal nests. Both female and male voles living communally engage in below average reproductive behaviors compared to non-communal voles (2, 3). Other studies show that communal living is more prevalent during winter with larger groups forming to increase survival (3). Ophir and colleagues experiment should have considered the environmental or group effects in the vole's decision to partake in certain lifestyles that could inhibit or trigger the V1aR pair-bonding expression.

The most common social lifestyle that prairie voles choose is male-female pair bonds which usually last a life time (4). However, Solomon and Jacquot monitored populations of prairie voles in enclosures over a longer two-year period than Ophir et al.'s 18 days (1, 5). Their results showed voles were not fixed to exhibit either a wonderer or resident behavior. Instead 31% of male and 57% of adult female wanderers became residents during the same field season with data showing that wonderers lived longer (5). The wanderer behavior seems to be more energetically favorable by excluding the cost of territoriality and having a higher net reproductive benefit than resident behavior. McGuire and Getz further supports the fluidity of prairie vole tactics by showing that 62% of male wanderers were adult residents in a pair bond or communal group, and, furthermore, around half of initial wanderers eventually formed/joined a pair bond/communal group (6). Different social or environmental signals may have occurred over certain periods of time changing reproductive tactics and potentially show fluctuation in V1aR expression.

Arginine vasopressin (AVP) and V1aR receptor are major factors in the formation of pair bonds. AVP mediates selective aggression and partner preference formation and allows voles to associate mates with thermal comfort and grooming through memory and learning (7). Furthermore, the *avpr1a* microsatellite polymorphism length influences neuronal phenotype, social attachment, and paternal behavior (8, 9). This provides a potential individual genetic variation in neural phenotype and behavior through the allele length that predicts V1aR expression (8). Longer *avpr1a* microsatellite alleles were more likely to successfully breed with multiple females, but held no influence on social behavior for residency status (9). Ophir et al. supported the importance of V1aR to pair bonding, but did not address the relationship between V1aR expression and the changing environmental/social cues. The V1aR expression might be the determining factor in prairie vole behavior or V1aR expression is a response to outside stimuli that indicates which social behavior a prairie vole should adopt.

1. Ophir A, Wolff J, & Phelps S (2008) Variation in neural V1aR predicts sexual fidelity and space use among male prairie voles in semi-natural settings. *Proc. Natl. Acad. Sci. U.S.A.* 105(4):1249-1254.
2. Getz LL & Carter CS (1996) Prairie-vole partnerships. *Am. Sci.* 84(1):56-62.
3. Getz LL, Hofmann JE, & Carter CS (1987) Mating System and Population Fluctuations of the Prairie Vole, Microtus ochrogaster. *Am. Zool.* 27(3):909-920.
4. Getz L, Carter CS, & Gavish L (1981) The mating system of the prairie vole, Microtus ochrogaster: Field and laboratory evidence for pair-bonding. *Behav. Eco. Sociobiol.* 8(3):189-194.
5. Solomon N & Jacquot J (2002) Characteristics of resident and wandering prairie voles, Microtus ochrogaster. *Can. J. Zool.* 80(5):951-955.
6. McGuire B & Getz L (2010) Alternative male reproductive tactics in a natural population of prairie voles Microtus ochrogaster. *Mam. Res.* 55(3):261-270.
7. Winslow J, Hastings N, Carter CS, Harbaugh C, & Insel T (1993) A role for central vasopressin in pair bonding in monogamous prairie voles. *Nature* 365(6446):545-548.
8. Ophir A, Campbell P, Hanna K, & Phelps S (2008) Field tests of cis-regulatory variation at the prairie vole avpr1a locus: Association with V1aR abundance but not sexual or social fidelity. *Horm. Behav.* 54(5):694-702.
9. Keane B, Parsons S, Smucker B, & Solomon N (2014) Length polymorphism at the avpr1a locus is correlated with male reproductive behavior in a natural population of prairie voles (Microtus ochrogaster). *Behav. Eco. Sociobiol.* 68(12):1951-1964.