**The impact of early-life experience on dendritic morphology and anxiety-related behaviors of adult prairie voles as a function of their sex and post-weaning social experience**

Omar Ali S. Al-Naimi, Jose R. Delvalle, Sophia S. Carryl, Maryam Bamshad

*Department of Biological Sciences, Lehman College – The City University of New York  
250 Bedford Park Blvd. West, Bronx, NY 10468*

**Abstract**

The evolution of monogamy may have more to do with anxiety than with love. A recent study posits that fear of cuckoldry was the driving force for human monogamy (Schacht and Belt, 2016). If that is the case, then a male’s anxiety levels may be a better determinant of his fidelity than his preference for a partner. We used prairie voles as a model of human social behavior to investigate the development of anxiety during early life and its impact on the adult brain. We compared the anxiety-related behaviors of male and female adult prairie-vole offspring that were raised in either socially or physically deprived environments following birth. We hypothesized that social factors would have a greater impact on the anxiety of voles and males would be more susceptible to those effects than females. Six days after birth, the housing of groups of breeding voles was manipulated such that offspring were raised to weaning with: 1) both parents under a protective cover (Control), 2) mother alone under a protective cover (SocDep), 3) both parents without a protective cover (PhyDep), 4) mother alone without a protective cover (SocPhyDep). The weaned offspring were sexed and housed under a cover either alone or with a same-sex sibling. As adults, each offspring was placed in an open-field arena and tested over three consecutive days so its anxiety levels could be measured towards: an empty space (Day 1), a same-sex social stimulus (Day 2), and a non-social object (Day 3). The brain of a subgroup of subjects was extracted and processed for Golgi staining to assess the impact of social deprivation on hippocampal dendritic morphology in male and female adult offspring. We found no changes in the anxiety levels of the females on any day of testing. However, males raised in socially-deprived conditions (SocDep and SocPhyDep) displayed lower anxiety on Day 2 of testing and spent more time in the center of the arena investigating the social stimulus than males in other groups. This effect was only evident in males that were raised with a sibling after weaning. Social isolation had a significant but unanticipated impact on the hippocampus of the voles. The apical dendritic length in the CA3 region of the hippocampus in male and female voles that experienced deprivation in early life and were then socially isolated as sub adults was longer than control voles. Our results suggest that the father’s presence in early life may modulate his sons’ anxiety levels and thus control their tendency to remain monogamous. Our data also indicate that deprivations experienced by young may prepare their brain to expect and counter challenges later in life.