"Evolutionary Neuroscience of Social Behavior"

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ABSTRACT:

The diversity of social behavior within and across species is astounding. We now have a basic understanding of how the brain generates context-appropriate behavior in an ever-changing world. Considerable progress has also been made towards reconstructing the evolution of the neuromolecular mechanisms that regulate and generate complex behavior, such as the vertebrate Social Decision-Making Network (SDMN). These findings underscore the similar roles of evolutionarily ancient fore- and midbrain structures as well as hormonal and neuromodulatory systems in the regulation of social behavior. In addition, similar gene expression networks can underlie the convergent evolution of complex phenotypes even across distantly related taxa, suggesting the repeated and parallel deployment of conserved molecular and neural pathways. Together, these results suggest that the vertebrate ancestor alive in the ocean ~500 MYA already had the neuromolecular apparatus in place to meet the challenges and opportunities imposed by fluctuating internal states and external environments (e.g., finding mates, defending resources, avoiding predators). I will present a phylogenetic comparative approach that integrates single cell and bulk RNA-seq as well as spatial transcriptomics to uncover how transcriptome variation reflects variation in ecology, demography, and life history across vertebrates. This novel approach begins to identify the causes and consequences of variation of an ancient brain system underlying complex behavior.