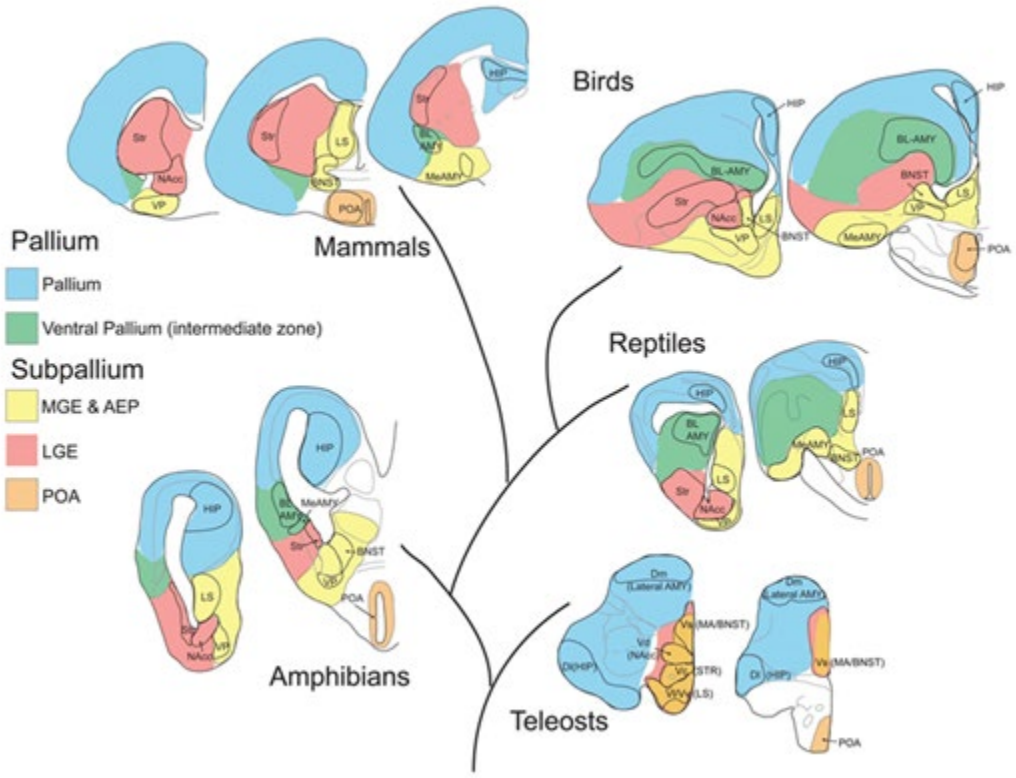
2019 Animal behavior Conference Plenary Speaker: Hans Hofmann

Talk Title:
Complex Homology and the Neuromolecular Evolution of Social Behavior

Abstract:
The social behavior of human and non-human animals can vary tremendously, depending on intrinsic and extrinsic factors, and can be remarkably diverse even among closely related species. Embracing this diversity, behavioral ecologists have provided a fundamental understanding of the adaptive value of many kinds of social behavior and how, and in which ecological contexts, such social systems have evolved. Taking advantage of laboratory animals bred to lack variation, behavioral neuroscientists, in turn, have gained a fairly detailed understanding of how the brain processes and stores socially relevant information, how it generates context-appropriate behavior, and (to a lesser extent) how behavior and its neural substrates develop during ontogeny. Since the beginning of the new millennium, investigators have increasingly become interested in integrating these seemingly disparate disciplines with the goal of (a) unraveling the causes and consequences of individual and population variation in brain and behavior in diverse species; and (b) reconstructing the evolution of the neuromolecular mechanisms that regulate and generate complex behavior. These studies show remarkably conserved roles of hormones (specifically sex steroids and neuropeptides) and neuromodulators (such as biogenic amines) in the regulation of social behavior, even in cases of convergently evolved social systems and across distantly related taxa. Extending these findings on a genomic scale, recent studies provide support for the intriguing hypothesis that coordinated activity of conserved sets of genes underlies independent evolutionary transitions to social behavioral phenotypes. Similarly, neural circuits such as the vertebrate Social Decision-Making Network are highly conserved, suggesting that much of the behavioral diversity we observe in nature reflects variations of an ancient theme. Maybe none of this should come as a surprise: the most recent common ancestor of all animals already had to meet challenges imposed by fluctuating internal states and external environments (finding mates, defending resources, avoiding predators, etc.). The mechanisms used by these ancestral organisms to maintain homeostasis likely served as the building blocks for the evolution of more derived behavioral responses. Here, we will introduce a novel conceptual framework – as well as present results from experimental and comparative studies – that integrate across levels of organization and spatial and temporal scales to untangle the origins and evolution of complex behavioral and neuromolecular phenotypes.


Pallium
Pallium
Ventral Pallium (intermediate zone)
Subpallium
MGE & AEP
LGE
POA
Mammals
Birds
Reptiles
Amphibians
Teleosts
Str
NAcc
VP
LS
BNST
POA
HIP
MeAMY
BL-AMY
Dm (Lateral AMY)
Vv (MA/BNST)
Vd (STR)
Dl (HIP)