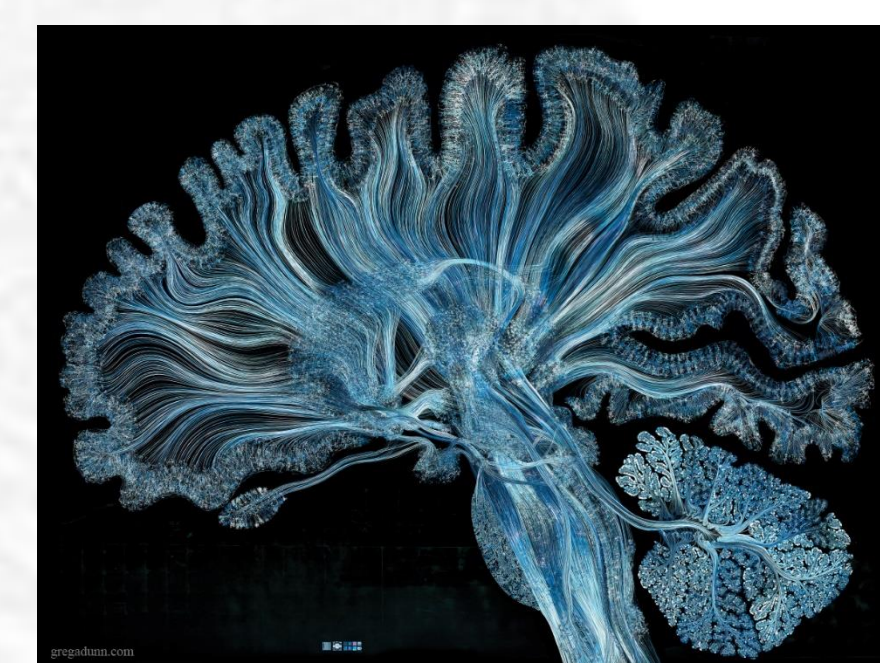




# The Interdisciplinary Major in Neuroscience

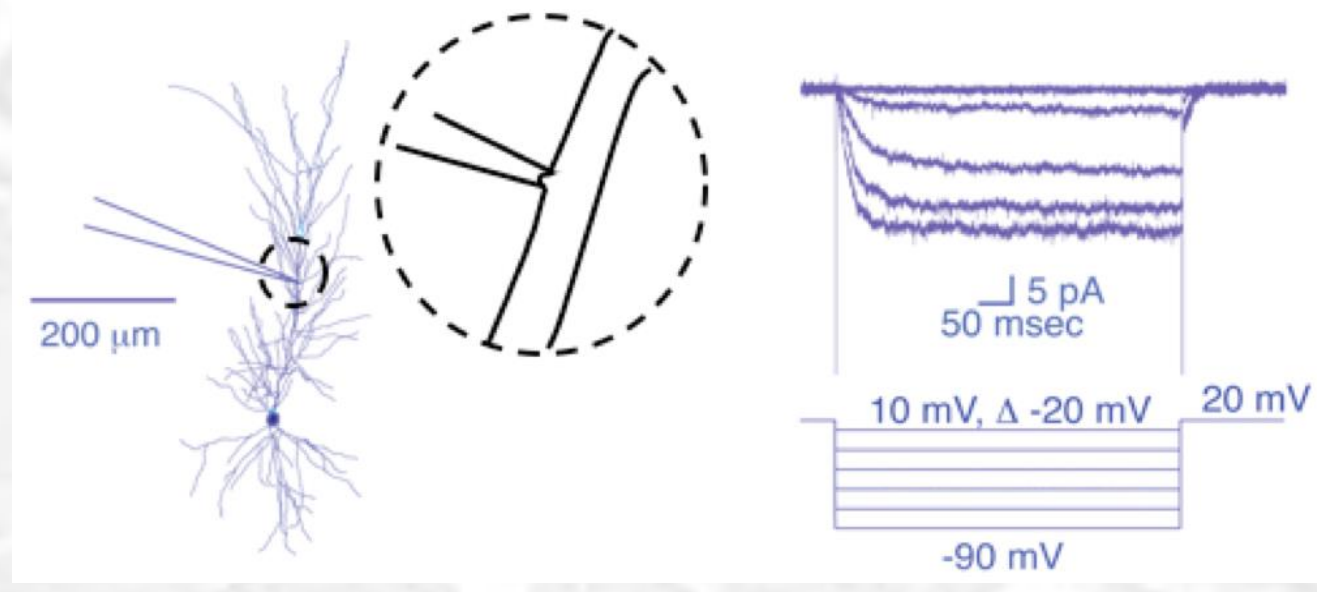
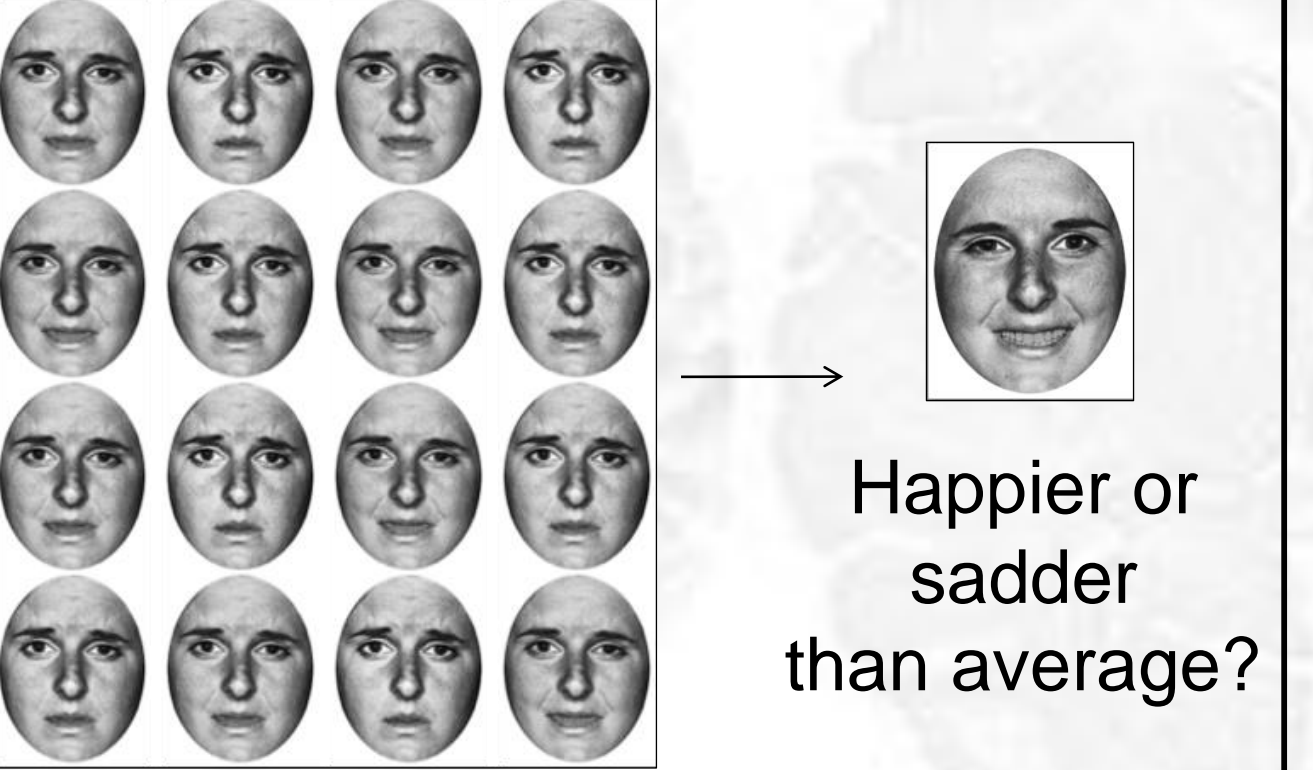
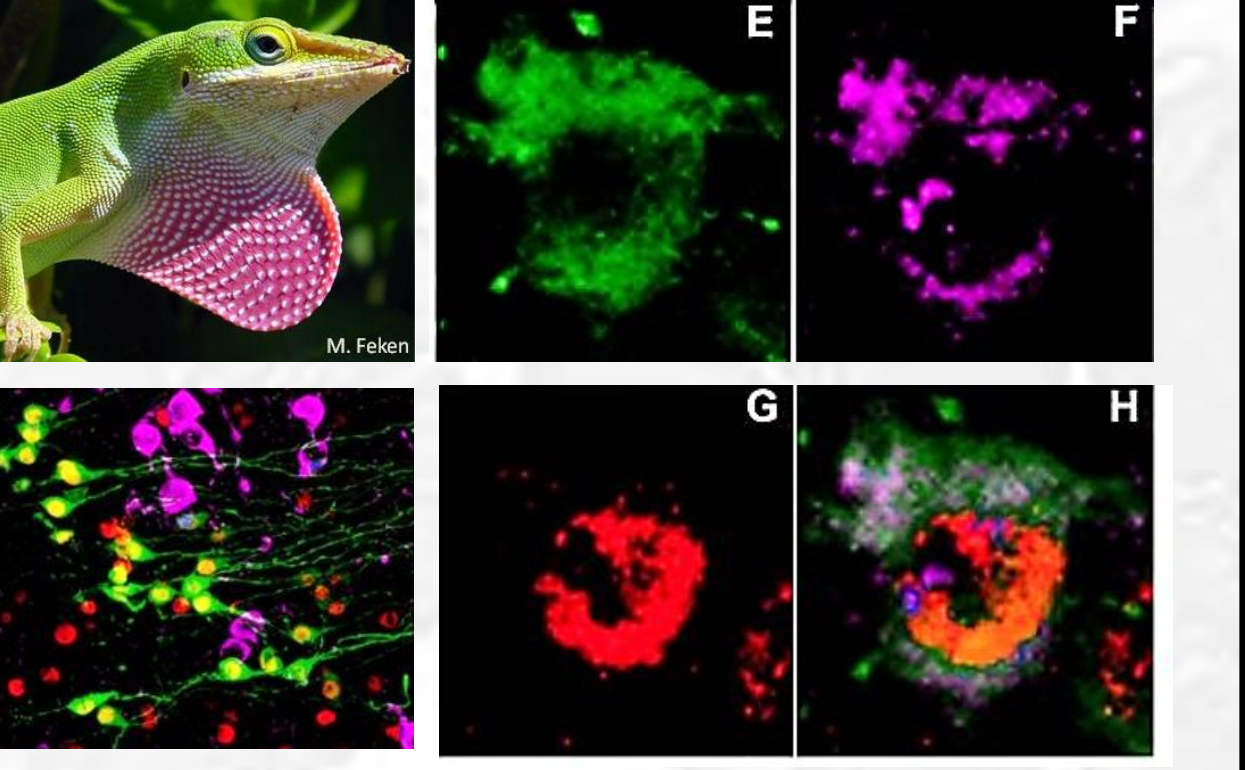

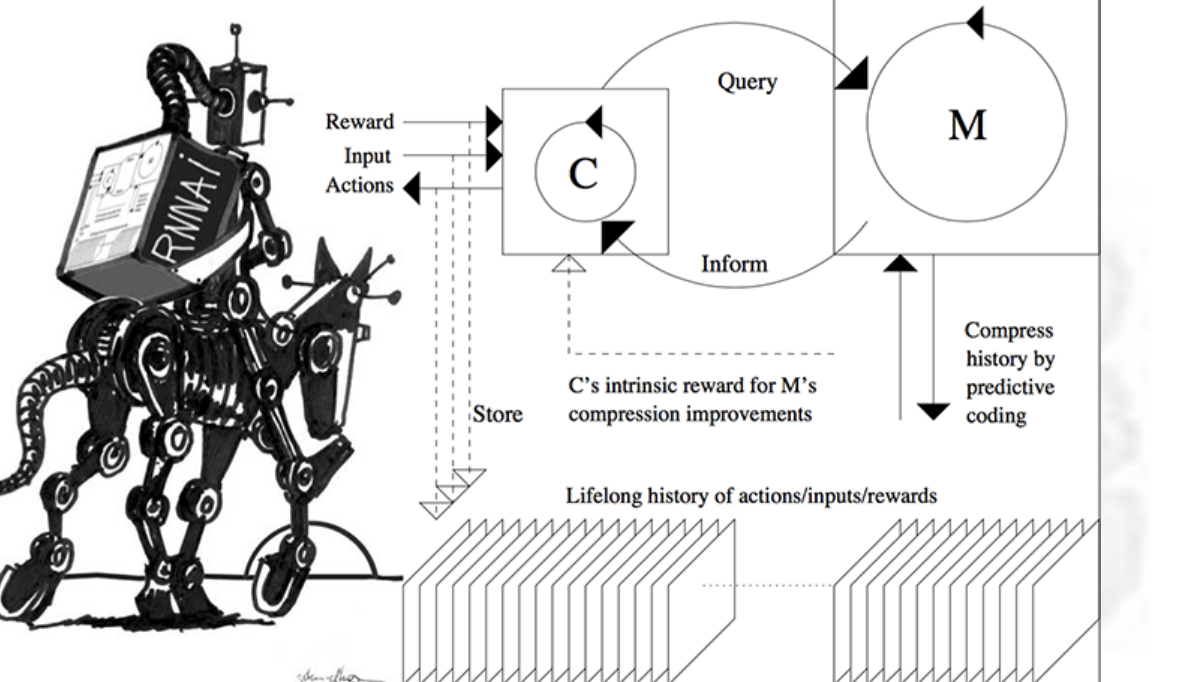
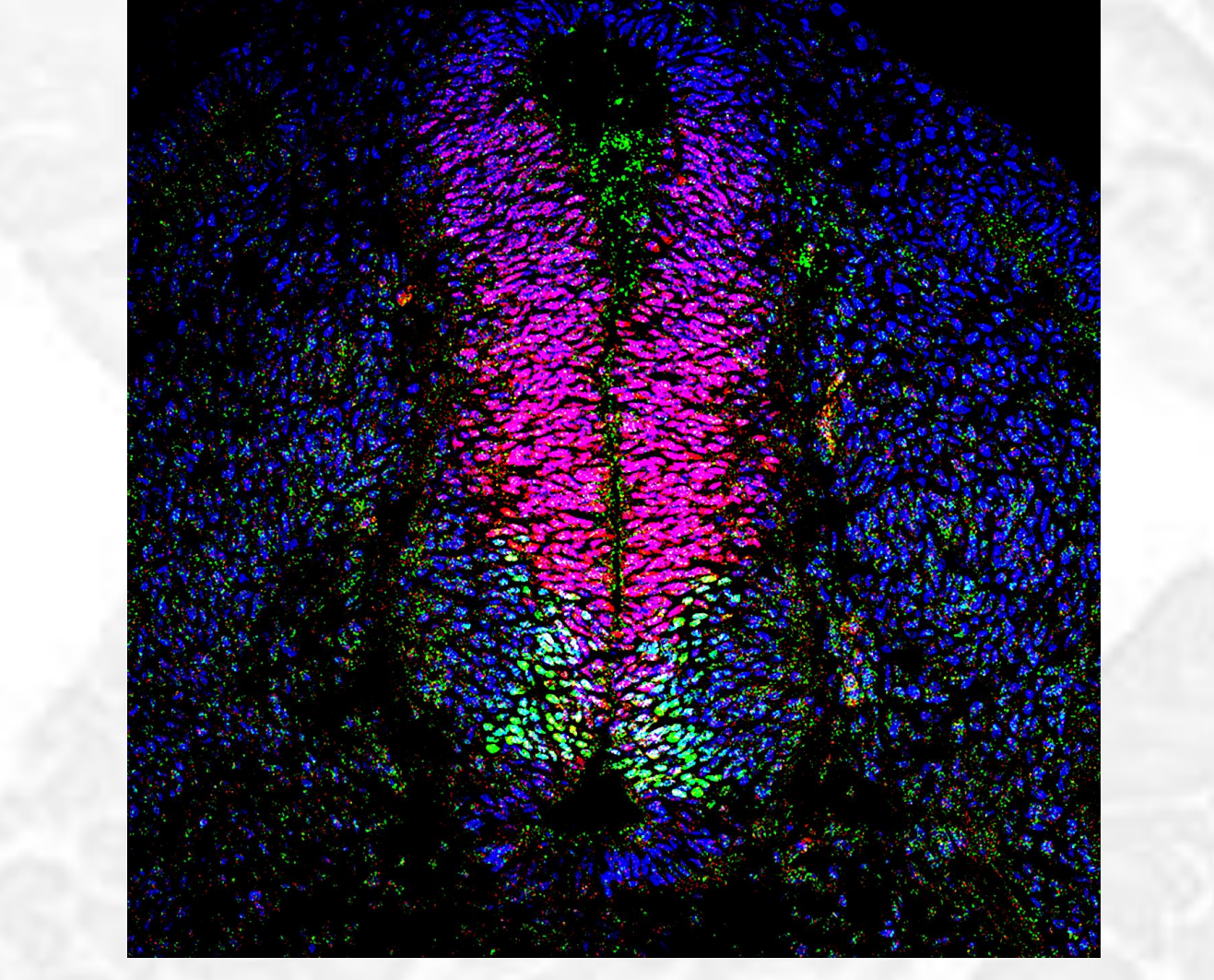
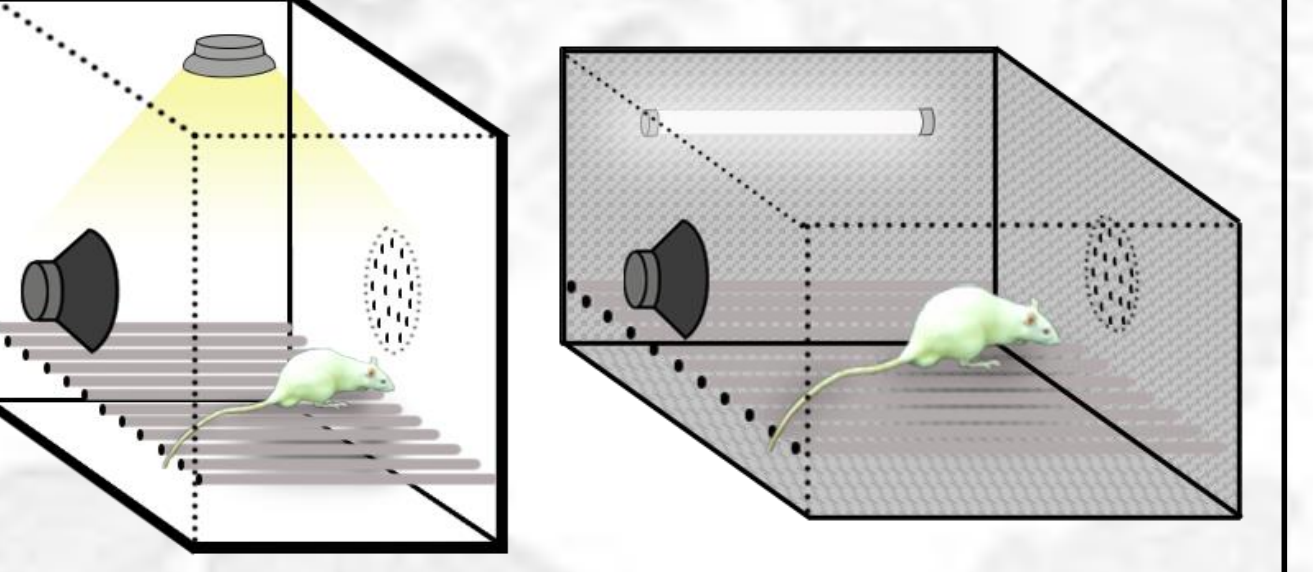
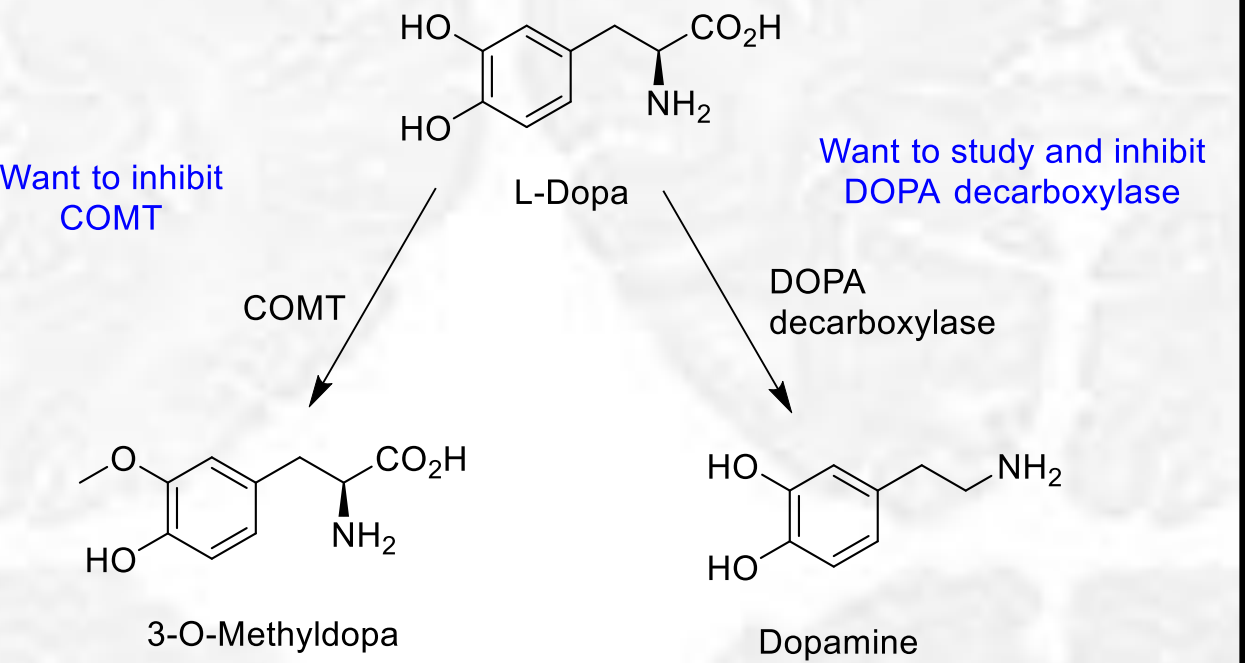
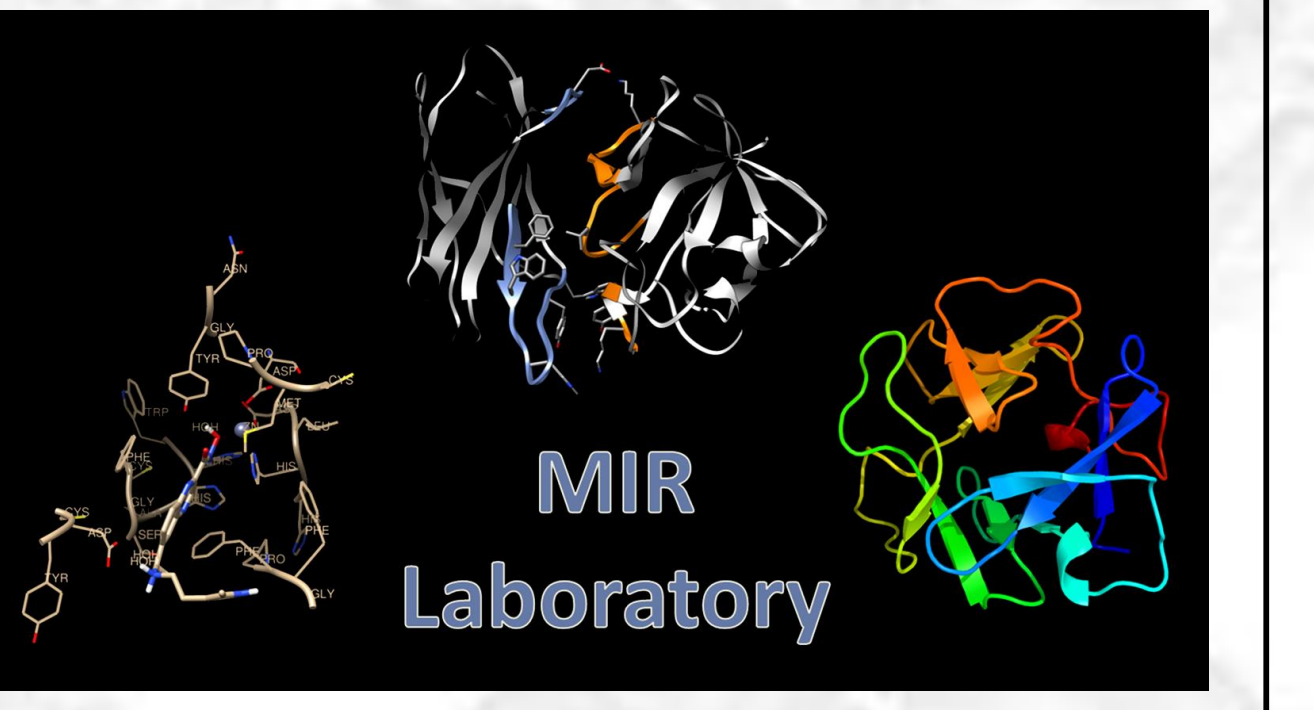

*Bridging the fields of Biology, Psychology, Chemistry and Philosophy*

**Committee:** Dr. Kelly Dougherty (Bio), Dr. Jason Haberman (Psych), Dr. David Kabelik (Bio, chair), Dr. Rebecca Klatzkin (Psych), Dr. Tanushree Pandit (Bio), Dr. Rodrigo Pedroza Llinás (Psych), Dr. Larryn Peterson (Chem)



**Available for Advising (2021-2022):** Dr. Jason Haberman (Psych, spring only), Dr. David Kabelik (Bio), Dr. Rebecca Klatzkin (Psych), Dr. Larryn Peterson (Chem), Dr. Katherine White (Psych)

## Neuroscience-Related Research at Rhodes College:

 <p><b>Dr. Dougherty</b> (Bio) investigates the biophysical mechanisms of antiepileptic drug (AED) action. She uses electrophysiological techniques to understand how AEDs directly influence the ionic currents flowing across the neuronal membrane (pictured above).</p>	 <p><b>Dr. Haberman</b> (Psych) is interested in visual cognition. He uses psychophysics to explore how the brain represents crowds of objects, such as faces. The visual system uses averages (e.g., average expression) to derive information about the natural world.</p>	 <p><b>Dr. Kabelik</b> (Bio) examines neuroendocrine circuitry regulating social behaviors, using lizards as simple vertebrate model systems. Studies utilize hormone analysis, pharmacology, behavioral observation, detection of neural markers, and molecular approaches.</p>	 <p><b>Dr. Klatzkin</b> (Psych) examines the physiological and psychological mechanisms underlying stress-induced eating in women.</p>	 <p><b>Dr. Millson</b> (Phil) investigates the application of question-based logics to curiosity-driven artificial intelligence. He examines how deep reinforcement learning agents designed to play video games can be augmented with a kind of “artificial curiosity” that offers intrinsic rewards for exploring their environments</p>
 <p><b>Dr. Pandit</b> (Bio) examines signaling mechanisms contributing to neural fate patterning and neural circuit formation during embryonic development.</p>	 <p><b>Dr. Pedroza Llinás</b> (Psych) investigates the neurobiology of aversive memories. He is specially interested in the biochemical mechanisms of pavlovian conditioning such as fear conditioning and conditioned taste aversion.</p>	 <p><b>Dr. Peterson</b> (Chem) synthesizes dopamine derivatives and related catechols 1) to serve as inhibitors of important enzymes involved in brain chemistry; and 2) to better understand the requirements of enzymes responsible for the biosynthesis and metabolism of dopamine.</p>	 <p><b>Dr. Stoddard</b> (Chem) focuses on (1) the synthesis and biological evaluation of our designed HDAC4-selective inhibitors that would be ideal for the neurological disorder Huntington's disease and glioma tumors and (2) modeling of proteins involved in neurological disorders.</p>	 <p><b>Dr. White</b> (Psych) investigates language and communication in younger and older adults, including the cognitive processes that underlie speaking and how gesture and speech interact.</p>

## Core Requirements (*take all*)

Chem 120&125L	Foundations of Chemistry & Lab (offered both fall & spring)
Biol 130&131L	Biology I & Lab (offered in fall, F7 course)
Biol 140&141L	Biology II & Lab (offered in spring)
Psyc 150	Introduction to Psychological Science (offered both fall & spring, F8 course)
Psyc 211 or Math 211	Statistical Methods (offered both fall & spring, F6 course)
Neur 270	Neuroscience (prerequisite: Biol 130 and 140, or Psyc 150, offered both fall & spring)
Neur 485 or 486	Senior Seminar (offered in spring, sometimes also fall)

## Depth Requirements (*take one Biol and one Psyc*)

Biol 375+Lab	Neuroendocrinology (prerequisite: Biol 130 and 140, usually offered in fall)
Biol 376+Lab	Molecular and Cellular Neuroscience (prerequisite: Biol 130 and 140, usually offered in spring)
Biol 377+Lab	Developmental Neuroscience (prerequisite: Biol 130 and 140)
Psyc 344+Lab	Movement Neuroscience (prerequisite: Psyc 150)
Psyc 345+Lab	Cognitive Neuroscience (prerequisite: Psyc 150)
Psyc 408+Lab	Neuroscience of Learning and Memory (prerequisite: Psyc 150)

## Breadth Requirements (*take two, or one plus a third depth*)

Chem 411+Lab	Medicinal/Computational Chemistry (must choose Neuroscience-related independent project, offered biennially)
Neur 299	Topics in Neuroscience
Neur 451/452	Independent Research in Neuroscience (4 credits required)
Phil 219	Foundations of Artificial Intelligence (no prerequisites)
Phil 319	Philosophy of the Cognitive Sciences (no prerequisites)
Psyc 318	Clinical Neuroscience (prerequisite: Neur 270 or Psyc 200)

## Electives (*choose two from the following list, or substitute with extra depth or breadth courses from above lists*)

Biol 204	Animal Development (w/ lab)	Psyc 218	Psychology of Addiction
Biol 207	Animal Behavior (w/ lab, F11 course)	Psyc 220	Psychology of Health
Biol 303 or 304	Genetics (304 is w/ lab)	Psyc 224	Psychological Disorders
Biol 307	Cell Biology	Psyc 231	Psychology of Aging
Biol 325	Molecular Biology (w/ lab)	Psyc 306	Psycholinguistics
Biol 340	Animal Physiology (w/ lab)	Psyc 327	Cognitive Processes
Chem 315	Biochemistry	Xxxx 451/452	Independent Research (4 credits of research in another department/program as approved by the Neuroscience committee)
Chem 416	Pharmacology		
Comp 141/142	Computer Science I or II		
Psyc 216	Perception		

