Title: From song to synapse: The neurobiology of vocal communication

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Abstract: Vocalizations are an essential medium for social and sexual signaling in mammals and birds. Whereas most animals only produce innate vocalizations, songbirds learn to sing in a process with many parallels to human speech learning. I will discuss recent advances from our lab highlighting the neural mechanisms that enable birdsong learning, including basal ganglia-dependent vocal exploration and reinforcement. How the learned song is integrated with innate vocalizations will also be considered, with reference to recent studies that genetically map neural circuits for innate vocalizations in mice.

Biography: Dr. Mooney has served as the George Barth Geller Professor of Research in Neurobiology since 2010. He earned a Bachelor's Degree in Biology from Yale University and a Ph.D. degree in Neurobiology from the California Institute of Technology. After completing a postdoctoral fellowship at Stanford University, he was appointed to the faculty of the Department of Neurobiology in the Duke University School of Medicine in 1994. Dr. Mooney is the Director of the Graduate Studies of the Neurobiology Program as well as the Director of the Predoctoral Neurobiology Training Program at Duke. Dr. Mooney's research examines the role of auditory experience in the development of brain and behavior, and the interplay between auditory and motor brain regions that enables vocal communication. He and his colleagues have identified how auditory experience alters the structure and function of nerve cells important to learned vocal communication, how these neurons are activated during expressive and receptive aspects of vocal communication, and the link between the auditory properties of these neurons and vocal perception. His research group has developed a wide range of expensive technical expertise in mouse and songbird models, including *in vivo* multiphoton and wide-field single-photon neuronal imaging, chronic recording of neural activity in freely vocalizing animals, *in vivo* and *in vitro* intracellular recordings from identified neurons, genetic and pharmacological silencing of neural activity, vocalization-contingent optogenetic manipulation of neuronal circuits, viral transgenic methods to manipulate gene expression, and machine learning methods for analyzing vocalizations and other behaviors.

Dr. Mooney has received the Moore Visiting Fellowship at Caltech, Wiersma Visiting Fellowship at Caltech, Dart Foundation Scholar's Award, McKnight Investigator Award, Sloane Research Fellowship, Klingenstein Research Fellowship and the Helen Hay Whitney Fellowship. He was also honored to receive the Master Teaching Award, the Davison Teaching Award and the Langford Prize from Duke University. His work has been funded by NIH, NSF, and many other funding institutions.