DUKE UNIVERSITY MEDICAL CENTER

CURRICULUM VITAE

for
Permanent Record

December 2018

Name: Richard Daniel Mooney, B.S., Ph.D.

Primary academic appointment: Department of Neurobiology

Present academic rank and title: George Barth Geller Professor of Neurobiology and Director of Graduate Studies, Neurobiology Training Program

Date and rank of first Duke Faculty appointment: March 1, 1994, Assistant Professor

Date of birth: May 27, 1958 Place: Evanston, IL

Citizen of: U.S.A.

Education:	Place	Date	Degree
High School	New Trier West H.S.	1976	Diploma
College	Yale University,	1981	B.S.
Graduate	California Inst. of Technology	1991	Ph.D.

Professional training and academic career:

1979 Research Assistant to Dr. Mark McClure, CT Agriculture Station. Field work studying the population biology of leafhoppers.

1981 Senior tutorial project with Dr. Alvin Novick, Yale University, Department of Biology. Survey of insect auditory structures specialized to detect the ultrasonic vocalizations of predatory echolocating bats.

1982-83 Laboratory assistant to Dr. Ward Watt, Stanford University, Department of Biology. Laboratory work related to the population genetics of *Colias* butterflies.

1983 Student at the San Francisco Conservatory of Music, pupil of David Tannenbaum, classical guitarist.

1984 Research assistant in the laboratory of Dr. James Hudspeth, UCSF Department of Physiology. Mechanoelectrical transduction in sensory hair cells of the amphibian inner ear.

1984-91 Ph.D. student with Dr. Mark Konishi, Neurobiology Predoctoral Training Program, California Institute of Technology.

1991 Enrolled in Cold Spring Harbor Laboratory course entitled "Optical Imaging of Structure and Function in the CNS." Introduction to the use of calcium-sensitive dyes in mammalian brain slice preparations.

1991-94 Postdoctoral fellow with Dr. Carla J. Shatz, Department of Molecular and Cell Biology, University of California at Berkeley, and Dr. Daniel V. Madison, Department of Molecular and Cellular Physiology, Stanford University.

1994-01 Assistant Professor, Department of Neurobiology, Duke University Medical Center, Durham, North Carolina.

2001- Associate Professor, Department of Neurobiology, Duke University Medical Center, Durham, North Carolina.

2009- Professor, Department of Neurobiology, Duke University Medical Center, Durham, North Carolina.

2009-18 Director of Graduate Studies, Program in Neurobiology, Duke University

2010- George Barth Geller Professor of Neurobiology

Publications:

Refereed Journals:

1. Mooney, R. and M. Konishi (1991) Two distinct inputs to an avian song nucleus activate different glutamate receptor subtypes on individual neurons. Proc. Natl. Acad. Sci. USA 88: 4075-4079.

2. Mooney, R. (1992) Synaptic basis for developmental plasticity in a birdsong nucleus. J. Neurosci. 12: 2464-2477.

3. Mooney, R., D.V. Madison and C.J. Shatz (1993) Enhancement of transmission at the developing retinogeniculate synapse. Neuron 10: 815-825.

4. Mooney, R. and M. Rao (1994) Waiting periods versus early innervation: the development of axonal connections in the zebra finch song system. J. Neurosci. 14: 6532-6543.

5. Mooney, R., A. Penn, R. Gallego and C.J. Shatz (1996) Thalamic relay of spontaneous retinal activity prior to vision. Neuron 17: 863-874.

6. Livingston, F. and R. Mooney (1997) Development of intrinsic and synaptic properties in a forebrain nucleus essential to avian song learning. J. Neurosci. 17(23):8997-9009.

7. Spiro, J., M. Dalva and R. Mooney (1999) Long-range inhibition within the zebra finch song nucleus RA can coordinate the firing of multipleprojection neurons. J. Neurophysiol. 81 (6): 3007-3020.

8. White, S., F. Livingston and R. Mooney (1999) Androgens modulate NMDA receptor-mediated EPSCs in the zebra finch song system. J. Neurophysiol. 82: 2221-2234.

9. Kittleberger, J.M. and R. Mooney (1999) Lesions of an avian forebrain nucleus that disrupt song development alter synaptic connectivity and transmission in the vocal premotor pathway. J. Neurosci. 19 (21): 9385-9398.

10. Rosen, M. and R. Mooney (2000) Intrinsic and extrinsic contributions to auditory selectivity in a song nucleus critical for vocal plasticity. J. Neurosci. 20: 5437-5448.

11. Livingston, F., S. White and R. Mooney (2000) Slow NMDA-EPSCs at synapse critical for song development are not required for song learning in zebra finches. Nature Neurosci. 3: 482-488.

12. Mooney, R. (2000) Different subthreshold mechanisms underlie song-selectivity in identified HVc neurons of the zebra finch. J. Neurosci. 20: 5420-5436.

13. Livingston, F. and R Mooney (2001) Androgens and isolation from adult tutors differentially affect the development of songbird neurons critical to vocal plasticity. J. Neurophysiology. 85: 34-42.

14. Mooney, R., W. Hoese and S. Nowicki (2001) Auditory representation of the vocal repertoire in a songbird with multiple song types. PNAS USA, 98: 12778-12783.

15. Rosen, M.J. and R. Mooney (2003) Inhibitory and excitatory mechanisms underlying auditory responses to learned vocalizations in the songbird nucleus HVC. Neuron (1): 177-94.

16. Sturdy, C.S., J.M. Wild and R. Mooney (2003) Respiratory and telencephalic modulation of vocal motor neurons in the zebra finch J. Neurosci. 23(3): 1072-1086.

17. Coleman, M. and R. Mooney (2004) Synaptic transformations underlying highly selective auditory representations of learned birdsong. J. Neurosci. 24(33): 7251-7265.

18. Sugiyama, Y.-Y. and R. Mooney (2004) Sequential learning from multiple tutors and serial retuning of neurons in a brain area important to birdsong learning. J Neurophys 92: 2771-88.

19. Kittelberger, M. and R. Mooney (2005). Acute Injections of BDNF in a vocal premotor nucleus reversibly disrupt adult birdsong stability and trigger syllable deletion. J Neurobiol 62: 406-424.

20. Wild, JM, Williams, MN, Howie, GJ and R Mooney (2005) Calcium binding proteins define interneurons in HVC of the zebra finch (*Taeniopygia guttata*). J Comp Neurol 483:76-90.

21. Mooney, R and J Prather (2005) The HVC microcircuit: the synaptic basis for interactions between song motor and vocal plasticity pathways. J Neurosci: 25 (8):1952-1964.

22. Kubke, MF, Sugiyama, Y-Y, Mooney, R and JM Wild (2005). Physiology of neuronal subtypes in the respiratory-vocal integration nucleus retroambigualis of the male zebra finch. J Neurophys 94: 2379-2390.

23. Rosen, MJ and R Mooney (2006) Stimulus dependent neuronal interactions in the avian song nucleus HVC revealed by dual intracellular recordings. J Neurophysiol. 95: 1158-1175.

24. Lei, H, R. Mooney and L. Katz (2006) Synaptic integration of olfactory information in mouse anterior olfactory nucleus. J Neurosci 26(46):12023-12032.

25. Roberts, T, JM Wild, F Kubke and R Mooney (2007) Homogeneity of intrinsic properties of sexually dimorphic vocal motoneurons in male and female zebra finches. J Comp Neurol 502: 157-169.

26. Roy, A and R Mooney (2007) Auditory Plasticity in a basal ganglia-forebrain pathway during decrystallization of adult birdsong. J Neurosci 27: 6374-6787.

27. Coleman, M, JM Wild and R Mooney (2007) Thalamic gating of auditory responses in the telencephalic song control nucleus HVC. J Neurosci 27 10024-10036.

28. Prather, J, S Peters, S Nowicki and R Mooney (2008) Precise auditory-vocal mirroring for learned vocal communication. Nature 451: 305-310.

29. Bauer, EE, MJ Coleman, TF Roberts, A Roy, JF Prather, R Mooney (2008) A synaptic basis for auditory-vocal integration in the songbird. Journal of Neuroscience 28: 1509-1522.

30. Roberts, T, M Klein, F Kubke, JM Wild and R. Mooney (2008) Telencephalic neurons monosynaptically link brainstem and forebrain premotor networks necessary for song. Journal of Neuroscience 28: 3479-3489.

31. Shea, SD, LC Katz and R Mooney. (2008) Noradrenergic induction of odor-specific neural habituation and olfactory memories. Journal of Neuroscience 28 (42):10711-10719.

32. Wild, JM, F Kubke and R Mooney (2009) The avian nucleus retroambigualis: cell types and projections to other respiratory-vocal nuclei in the brain of the zebra finch (Taeniopygia guttata). Journal Comparative Neurology 512 (6): 768-783.

33. Prather, J, S Nowicki, RC Anderson, S Peters and R Mooney. (2009) Neural correlates of categorical perception. Nature Neuroscience. 12: 221-228.

34. Roy, A and R Mooney. (2009) Song decrystallization in adult zebra finches does not require the song nucleus NIf. Journal of Neurophysiology 102 (2): 979-991

35. Mooney, R. (2009) Neural mechanisms for learned birdsong. Learning and Memory 16:655-669.

36. Lei, H and R Mooney (2010). Manipulation of a central auditory representation shapes learned vocal output. Neuron 65: 122-134. PMCID: PMC2822725.

37. Roberts, T, K Tschida, M Klein and R Mooney (2010). Rapid spine stabilization and synaptic enhancement at the onset of behavioural learning. Nature 463: 948-952. PMCID: PMC2918377.

38. Prather, J, S Nowicki, S Peters, R Mooney (2010) Persistent representation of juvenile experience in the adult songbird brain. J Neurosci 30: 10586-10598. PMCID: PMC2927487.

39. Ben-Shaul Y, Katz LC, Mooney R, Dulac C. (2010) In vivo vomeronasal stimulation reveals sensory encoding of conspecific and allospecific cues by the mouse accessory olfactory bulb. Proceedings of the National Academy of Science USA 107(11): 5172-5177. PMCID: PMC2841925.

40. Tschida, K and R Mooney. (2012). Deafening drives cell type specific changes to dendritic spines in a sensorimotor nucleus important to learned vocalizations. Neuron 73 (5): 1028-1039. PMCID: PMC3299981.

41. Prather, J, S Peters, R Mooney and S Nowicki (2012) Sensory constraints on birdsong syntax: Neural responses to swamp sparrow songs with accelerated trill rates. Animal Behaviour 83: 1411-1420. PMCID: PMC3748630.

42. Roberts, TF, SMH Gobes, M Murugan, BP Olveczky, R Mooney (2012) Motor circuits are required to encode a sensory model for imitative learning. Nature Neuroscience 15: 1454-1459. PMCID: PMC3458123.

43. Hamaguchi, K and R Mooney. (2012). Recurrent interactions between the input and output of a songbird cortico-basal ganglia pathway are implicated in vocal sequence variability. Journal of Neuroscience 32(34): 11671-11687. PMCID: PMC3448956.

44. Takatoh, J, A Nelson, X Ahou, MM Bolton, MD Ehlers, BR Arenkiel, R Mooney, and F Wang. (2013). New modules are added to vibrissal premotor circuitry with the emergence of exploratory whisking. Neuron 77(2): 346-360. PMCID: PMC3559006.

45. Nelson, A, DM Schneider, J Takatoh, K Sakurai, F Wang, and R Mooney. (2013). A circuit for motor cortical modulation of auditory cortical activity. Journal of Neuroscience 33(36): 14342-14353. PMCID: PMC3761045.

46. Murugan, M, S Harward, C Scharff, and R Mooney. (2013). Diminished FoxP2 levels affect dopaminergic modulation of corticostriatal signaling important to song variability. Neuron 80: 1464-1476. PMCID: PMC3881289.

47. Yoon, I, K Hamaguchi, IV Borzenets, G Finkelstein, R Mooney, BR Donald (2013). Intracellular Neural Recording with Pure Carbon Nanotube Probes. PLOS e65715. PMCID: PMC3686779.

48. Hamaguchi, K, K Tschida, I Yoon, BR Donald, and R Mooney (2014). Auditory synapses to song premotor neurons are gated off during vocalization in zebra finches. Elife. 3:e01833. PMCID: PMC3927426.

49. Mooney, R. (2014). Auditory-Vocal Mirroring in Songbirds: Phenomenology to Function. Philosophical Transactions B. The Royal Society, London, England. 369 (144): 20130179. PMCID: PMC4006181.

50. Schneider, D, A Nelson, and R Mooney. (2014). A synaptic and circuit basis for corollary discharge in the auditory cortex. Nature 513: 189–194. PMCID: PMC4248668.

51. Tseng, WC, PM Jenkins, M Tanaka, R Mooney, and V Bennett. (2015). Giant ankyrin-G stabilizes somatodendritic GABAergic synapses through opposing endocytosis of GABAA receptors. Proceedings National Academy of Science USA. 112(4):1214-9. PMCID: PMC4313813.

52. Peh, WY, TF Roberts and R Mooney. (2015). Imaging auditory representations of song and syllables in populations of sensorimotor neurons essential to vocal communication. J Neurosci 35(14):5589-605. PMCID: PMC4388922.

53. Tanaka, M, J Singh Alvarado, M Murugan and R Mooney. (2016) Focal expression of mutant huntingtin in the songbird basal ganglia disrupts cortico-basal ganglia networks and vocal sequences. Proceedings National Academy of Science USA 113(12):E1720-7. PMCID: PMC4812762

54. Nelson, A and R Mooney. (2016) The basal forebrain and motor cortex provide convergent yet distinct movement-related inputs to the auditory cortex. Neuron 90(3):635-48. PMCID: PMC4866808.

55. Hamaguchi K, Tanaka M, Mooney R. (2016) A Distributed Recurrent Network Contributes to Temporally Precise Vocalizations. Neuron. 91:680-93. PMCID: PMC4975959.

56. Kim H, Kunz PA, Mooney R, Philpot BD, Smith SL (2016). Maternal Loss of Ube3a Impairs Experience-Driven Dendritic Spine Maintenance in the Developing Visual Cortex. The Journal of Neuroscience. 36: 4888-94. PMID 27122043

57. Roberts T, Hisey E, Tanaka M, Kearney M, Chattreee G, Yang CF, Shah N, Mooney R (2017). Identification of a motor to auditory pathway important for vocal learning. Nature Neuroscience 20: 978-986. PMCID: PMC5572074.

58. Hisey E, Kearney M, Mooney R (2018). A common neural circuit mechanism for internally guided and externally reinforced forms of motor learning. Nature Neuroscience 21: 589–597. PMCID: PMC5963939.

59. Lu J, Li C, Singh-Alvarado J, Zhou ZC, Fröhlich F, Mooney R, and F Wang. MIN1PIPE: A Miniscope 1-Photon-Based Calcium Imaging Signal Extraction Pipeline. Cell Reports 23:3673-3684. PMCID: PMC6084484.

60. Schneider D, Sundararajan J, Mooney R (2018). A cortical filter that learns to suppress the acoustic consequences of movement. Nature 561: 391-395. PMCID: PMC6203933

61. Tanaka M, F Sun, Y Li, Mooney R. (2018) A mesocortical dopamine circuit enables the cultural transmission of vocal behavior. Nature 563: 117-120. PMCID: PMC6219627

Manuscripts submitted, in review, in revision, or in preparation:

62. Tschida K, V Michael, B-X Han, S Zhao, K Sakurai, R Mooney, F Wang (bioRxiv; in review at Neuron). Identification of midbrain neurons essential for vocal communication. doi:https://doi.org/10.1101/310250

63. Kearney M, Warren T, Hisey E, Qi J, Mooney R (*in preparation*). Opponent input arms of a reinforcement circuit for vocal learning.

Non-Refereed publications:

1. Mooney, R. and A.J. Doupe (1991) Neurobiology of birdsong: Circuits, synapses, and development. Disc. Neurosci. 7: 100-111.

Chapters in books:

1 Mooney, R. (1997-present) The auditory system. In: Neuroscience, D. Purves et al (eds.). Sinauer Associates: Sunderland, MA, Chapter 12, editions 1-4.

2. Mooney, R. (1997-present) The vestibular system. In: Neuroscience, D. Purves et al (eds.). Sinauer Associates: Sunderland, MA, Chapter 13, editions 1-4.

3. Mooney, R., M.F. Bear, T.J. Carew, M. Hammer, U. Heinemann, L.C. Katz, M. Korte, M. Poo, S.M. Schacher and E.M. Schuman (1997) Are the cellular mechanisms of synaptic development related to synaptic plasticity and to learning in the adult? Dahlem Workshop on Mechanistic Relationships Between Development and Learning: Beyond Metaphor.

4. Mooney, R. (2004) Synaptic mechanisms for auditory-vocal integration and the correction of vocal errors. In: The Behavioral Biology of Birdsong, H. Zeigler and P. Marler (eds.). Annals of the NY Academy of Science.

5. Mooney, R. (2004, 2007) Birdsong: the neurobiology of avian vocal learning. In: Encyclopedia of Neuroscience, G. Adelman and B.H. Smith (eds.), 3rd and 4th Editions. Elsevier Science: Amsterdam.

6. Kittelberger, J. M. and R. Mooney (2005). Synaptic mechanisms and sensitive periods for song learning. In: Behavior and Neurodynamics for Auditory Communication, Kanwal J.S. and Ehret G. (eds.). Cambridge University Press: Cambridge, UK.

7. Mooney, R, J Prather and T Roberts (2009). Neurophysiology of Birdsong Learning. In: Learning and Memory, a Comprehensive Reference, J Byrne, Ed. Elsevier Science: Amsterdam

8. Prather, JF and R Mooney (2009). Song-selective neurons in the songbird brain: synaptic mechanisms and functional roles. In: Birdsong, Edited by HL Zeigler and P Marler. Cambridge University Press.

9. Prather, JF and R Mooney (2013). Auditory vocal mirror neurons for learned vocal communication. In: Birdsong, Speech, and Language, JJ Bolhuis and M Everaert. MIT Press.

10. Prather, JF and R Mooney (2015) Mirror neurons in the songbird brain: A neural interface for learned vocal communication. In New Frontiers in Mirror Neurons Research. Oxford University Press.

Other:

a. Published scientific reviews

1. Mooney, R. (1995) The Illuminated Songbird. Curr. Biol. 5: 609-611.

2. Mooney, R. and J. Spiro (1997) Birdsong: Of tone and tempo in the telencephalon. Curr. Biol. 7: 289-291.

3. Mooney, R. (1999) Sensitive periods and circuits for learned birdsong. Current Opinions in Neurobiology 9: R688-R690.

4. White, S. and R. Mooney (1999) Birdsong: Can an old bird change his tune? Current Biology 9: R688-R690.

5. Sturdy, C. and R Mooney (2000) Bird Communication: Two voices are better than one. Current Biology 10: R634-R636.

6. Mooney, R., M.J. Rosen and C.B. Sturdy. (2002) A bird's eye view: top down intracellular analyses of auditory selectivity for learned vocalizations. J Comp Physiol. A 188: 879-895.

7. Prather, J. and R. Mooney (2004) Neural correlates of learned song in the avian forebrain: simultaneous representation of self and others. Current Opinions in Neurobiology 14: 1-7.

8. Mooney, R. (2009) Neural mechanisms for learned birdsong. Learning and Memory 16: 655-669.

9. Mooney, R (2009) Neurobiology of song learning. Current Opinions in Neurobiology 19: 654–660.

10. Tschida, K and R Mooney (2012) The role of auditory feedback in vocal learning and maintenance. Current Opinions in Neurobiology. 22:320-327. PMCID: PMC3297733.

11. Roberts, TF and R Mooney (2013) Motor circuits help encode auditory memories of vocal models used to guide vocal learning. Hearing Research Annual Review. 303:48-57. PMCID: PMC3689868.

12. Mooney, R. (2014). Auditory-Vocal Mirroring in Songbirds. Philosophical Transactions B. The Royal Society, London, England. 369(1644):2013179. PMCID: PMC4006181.

13. Schneider, DM and R Mooney (2015) Motor-related signals in the auditory system for listening and learning. Current Opinion in Neurobiology. 33:78-84. PMCID: PMC4523439.

14. Mooney, R. (2018) The Song Remains the Same. Trends in Neurosciences 4:167-170. PMCID: PMC6010202.

15. Schneider, DM and R Mooney (2018) How movement modulates hearing. Annual Review of Neuroscience 41:553-572. PMCID: PMC6201761

b. Journal Issues Edited

1. Sensory Systems. Edited by Y Dan and R Mooney (2006) Current Opinion in Neurobiology 16(4). Elsevier

c. Selected Abstracts (this section not updated after 2001):

1. *Mooney, R. and M. Rao (1987) Development and connectivity of sexually dimorphic song nuclei. Soc. Neurosci. Abstr. 13: 687.*

2. *Mooney, R. and M. Konishi (1989) NMDA receptors mediate synaptic transmission in a zebra finch song control nucleus. Soc. Neurosci. Abstr. 15: 347.*

3. *Mooney, R. (1991) Intrinsic oscillatory properties of vocal premotor neurons in the zebra finch forebrain. Soc. Neurosci. Abstr. 17: 1050.*

4. *Mooney, R., D.V. Madison and C.J. Shatz (1992) Changes in synaptic strength within the developing LGN produced by high frequency stimulation. Cold Spring Harbor Meeting on Learning and Memory: 45.*

5. *Mooney, R., D.V. Madison and C.J. Shatz (1992) Activity-dependent enhancement of synaptic transmission within the developing LGN. Soc. Neurosci. Abstr. 18: 923.*

6. *Mooney, R., E.M. Schuman and D.V. Madison (1993) Properties of synaptically-coupled CA3 and CA1 neurons in organotypic cultures. Soc. Neurosci. Abstr. 19: 611.*

7. Mooney, R., A.A. Penn, R. Gallego and C.J. Shatz (1995) Periodic synaptic currents in the neonatal LGN are generated by retinal activity. Soc. Neurosci. Abstr. 21: 1504.

8. Penn, A.A., R. Gallego, Mooney, R. and C.J. Shatz (1995) Spontaneous retinal inputs drive postsynaptic action potentials in the LGN. Soc. Neurosci. Abstr. 21: 1504.

9. Spiro, J.E., M.B. Dalva and R. Mooney (1996) Local inhibitory networks in the zebra finch RA revealed with dual intracellular recordings and photostimulation. Soc. Neurosci. Abstr. 22: 152.

10. Livingston, F. and R. Mooney (1996) Intrinsic and synaptic properties of L-MAN neurons in the adult male zebra finch. Soc. Neurosci. Abstr. 22: 152.

11. Rosen, M.J. and R. Mooney (1997) Intracellular recordings of song-selective neurons in a forebrain nucleus critical to song learning. Soc. Neurosci. Abstr. 23:245.

12. Kittelberger, J.M. and R. Mooney (1997) Individual HVc axons innervate RA subdomains that control temporal and spectral elements of learned song. Soc. Neurosci. Abstr. 23: 245.

13. Stacy, R.C., F.S. Livingston, J.E. Spiro and R. Mooney (1997) Developmental changes in song system neuron morphology as revealed by intracellular staining in brain slices. Soc. Neurosci. Abstr. 23: 245.

14. Rosen, M. and R. Mooney (1998) Local inhibition modulates song-selective auditory responses within the song nucleus LMAN. Soc. Neurosci. Abstr. 24: 189.

15. Spiro, J. and R. Mooney (1998) Structure and function of inhibitory circuits in a forebrain nucleus critical for production of learned song. Soc. Neurosci. Abstr. 24: 189.

16. Livingston, F., S. White and R. Mooney (1998) NMDA receptor-mediated EPSCs within two song nuclei are testosterone-sensitive during early song development. Soc. Neurosci. Abstr. 24: 191.

17. Rosen, M. and R. Mooney (1999) The contribution of local circuitry to refinement of song-selective responses in a song learning pathway. Soc. Neurosci. Abstr. 25: 623.

18. Mooney, R. (1999) Intracellular analysis of song-selective auditory responses in identified HVc neurons. Soc. Neurosci. Abstr. 25: 623.

19. White, S.A., Livingston, F.S. and R. Mooney (1999) Auditory and social isolation alters NMDA-EPSCs within LMAN, but not in RA, during song development. Soc. Neurosci. Abstr. 25: 623.

20. Spiro, J.E. and R. Mooney (1999) An intracellular study of auditory responses in the zebra finch song nucleus RA. Soc. Neurosci. Abstr. 25: 624.

21. Kittelberger, J.M. and R. Mooney (1999) Lesions of LMAN that disrupt song development act transynaptically to modify synaptic connections in the vocal motor pathway. Soc. Neurosci. Abstr. 25: 1367.

22. Hoese, W.J., S. Nowicki, J. Moore and R. Mooney (2000) Auditory encoding of multiple song types in the swamp sparrow HVc. Soc. Neurosci. Abstr. 26: 758.13

23. White, S.A. and R. Mooney (2000) Androgens accelerate NMDA-EPSC development but do not prevent extended learning in zebra finch isolates. Soc. Neurosci. Abstr. 26: 758.2

24. Kittelberger, J.M. and R. Mooney (2000) Acute BDNF injections in a vocal premotor nucleus in the avian song system reversibly disrupt adult song stability. Soc. Neurosci. Abstr. 26: 208.5

25. Livingston, F.S. and R. Mooney (2000) Testosterone and isolation differentially affect the intrinsic properties of LMAN neurons. Soc. Neurosci. Abstr. 26: 758.3

26. Mooney, R. and M.J. Rosen (2000) Subthreshold mechanisms of note combination sensitivity in identified zebra finch HVc neurons. Soc. Neurosci. Abstr. 26: 758.11

27. Sturdy, C.B., J.M. Wild and R. Mooney (2000) Intrinsic electrophysiological properties and synaptic connections of zebra finch vocal motor neurons. Soc. Neurosci. Abstr. 26: 758.8

28. Rosen, M.J. and R. Mooney (2000) Local and extrinsic contributions to song-selectivity in the zebra finch song nucleus HVC. Soc. Neurosci. Abstr. 26: 758.12

29. Rosen, M.J. and R. Mooney (2001) Sources of song-evoked inhibition in the zebra finch song nucleus HVc. Soc. Neurosci. Abstr. 27: 318.1

30. Kittelberger. J.M. and R. Mooney (2001) Acute BDNF injections that reversibly disrupt adult birdsong stability induce a rapid decrease in TRK receptor phosphorylation. Soc. Neurosci. Abstr. 27: 538.7

d. Editorials, position, and background papers:

Mooney, R. (2006) Lawrence Charles Katz, Obituary. Nature Neuroscience 9:3.

Consultant appointments:

2018-	Ascona Assembly of Neural Circuits Organizing Committee
2017	Intramural Investigator Review, NIDCD
2016-	McKnight Scholars Selection Committee
2014-	Society for Neuroscience Young Investigator Award Selection Committee
2010-15	Searle Scholars Selection Committee
2008-	Ad Hoc Reviewer SMI Study Section, NIH
2007-	Ad Hoc Reviewer for the National Science Foundation
2005-07	Ad Hoc Reviewer for NIDCD ZRG1/ZDC1 Fellowships
2004-06	Review Panel, Dart Foundation Scholars Program, MBL
2002-06	SMI Study Section, NIH, Full time member
1999	NINDS, Developmental Neurobiology – Site visit member
1996	Ad Hoc Member, Biopsychology Study Section, NIH

Professional awards and special recognitions:

Distinguished Lecture in Neurobiology, University of Pittsburgh, 2019
Distinguished Speaker, Harvard Speech and Hearing Program, 2018
Keynote Speaker, Helen Wills Institute Retreat UC Berkeley, 2017
Keynote Speaker, McKnight Foundation Annual Meeting, 2017
Special Lecture, Society for Neuroscience Annual Meeting, 2016
Kuffler Lecture, Harvard University, 2016
Sinauer Lecture, University of Massachusetts, 2014
Research Mentor of the Year, Duke University School of Medicine, 2014
Outstanding Postdoc Mentor at Duke University, 2011
Wiersma Visiting Professorship, Caltech, 2007
Master Teacher Award, Duke University School of Medicine, 2004
DART Foundation Scholar, 2003
Langford Prize, Duke University, 2002
Davison Society Teaching Award, 1999

Alfred P. Sloan Research Fellowship Award, 1997

Esther and Joseph Klingenstein Fellowship in the Neurosciences, 1997

Klingenstein Fellowship Award in the Neurosciences, 1997

Sloan Foundation Award, 1997

Helen Hay Whitney Foundation Postdoctoral Fellowship, 1992-1994

McKnight Neuroscience Scholars Award, July 1994

Organizations and participation:

Society for Neuroscience

American Physiological Society

Invited Talks:

Neuroscience School of Advanced Studies, Venice	June, 2019
University of Pittsburgh Distinguished Lecture	May 2019
Columbia Neuroscience Seminar Series	May, 2019
Princeton Neuroscience Institute	May, 2019
UCLA Neuroscience Seminar Series	February, 2019
Chen Institute Symposium, Caltech	January, 2019
Baylor Department of Neuroscience	May, 2018
University of Pennsylvania Neuroscience	May, 2018
Distinguished Speaker, Harvard Speech and Hearing	April, 2018
Chapel Hill Bird Club	February, 2018
University of Southern California, Neuroscience	February, 2018
Neurobiology of Mental Health, Geneva	January, 2018
FMI Basel Invited Lecture	December, 2017
Royal Society Meeting on Hearing	December, 2017
Helen Wills Institute UC Berkeley Retreat	October, 2017
Ascona Circuit Assembly and Function	October, 2017
University of Maryland Animal Communication	September, 2017
Kavli Workshop on Auditory Processing	July, 2017
McKnight Foundation Meeting, Keynote Speaker	June, 2017
Washington University	May, 2017
Penn State Neuroscience Series	April, 2017
NIH/NINDS Neuroscience Series	April, 2017
Yale Psychiatry	March, 2017
Oxford University	March, 2017
Imperial College, London	March, 2017
SFN Special Lecture	November, 2016
University of Utah Neuroscience Snowbird Symposium	October, 2016
OIST Summer Workshop	August, 2016
NYU Neuroscience Series	May, 2016
MPI Jupiter Invited Lecture	May, 2016

Neural Control of Movement, Montego Bay Jamaica	April, 2016
Kuffler Lecture, Harvard University	April, 2016
COSYNE, Invited Speaker	February, 2016
Ascona Assembly and Function of Neuronal Circuits	September, 2015
Woods Hole Course on the Inner Ear	August, 2015
McGovern Symposium on Corollary Discharge, MIT	April, 2015
MPI Sunposium, Jupiter, FL	March, 2015
German Neuroscience Meeting, Gottingen	March, 2015
University of Munich	March, 2015
CSHL	February, 2015
MURI Symposium, UCSD	January, 2015
Boston University	November, 2014
Eaton Peabody, MEEI	November, 2014
FENS Social Brain Conference, Copenhagen	October, 2014
Sinauer Lecture, University of Massachussetts	September, 2014
Gordon Research Conference, Auditory System	July, 2014
Cold Spring Harbor Labs	June, 2014
UW Seattle	May, 2014
Harvard University	May, 2014
Duke Pediatric Retreat Keynote Speaker	April, 2014
HHMI Janelia Farm, Reading a Map Workshop	April, 2014
Penn Sound Symposium	October, 2013
Gordon Research Conference, Dendrites, Switzerland	May, 2013
Duke Forward, New York City	April, 2013
Columbia University	April, 2013
University of Tennessee Health Center	March, 2013
Mark Konishi Symposium, Caltech	February, 2013
Emory University	November, 2012
University Paris Descartes	September, 2012
Erice Mirror Neuron Workshop, Sicily, Italy	September, 2012
FENS, Barcelona, Spain	July, 2012

Yale University	April 2012
UC Davis	March, 2012
HHMI Janelia	January, 2012
NEOUCOM	December, 2011
GHSU Keynote Speaker	November, 2011
Northwestern University	October, 2011
Caltech	May, 2011
Harvard University	April, 2011
University of Chicago	April, 2011
Janelia HHMI Vocal communication	March, 2011
MPI Frankfurt, Germany	January, 2011
University of Pennsylvania	November, 2010
University of Rochester	September, 2010
UCSF Neuroscience Program	May, 2010
Janelia Farms Conference on Structural Plasticity	March, 2010
University of Maryland	March, 2010
Burke Institute	December, 2009
Ascona Assembly and Function of Neuronal Circuits	October, 2009
8th Internat'l W'shop on Auditory Processing	September, 2009
UC Berkeley Neuroscience Program	August, 2009
RIKEN BSI Workshop, Invited Speaker	July, 2009
Helmholtz Lecture, University of Utrecht	April, 2009
COSYNE, Snowbird, Utah	March, 2009
University of North Carolina	February, 2009
Duke Colloquim Series	November, 2008
McGill University, Dept, of Pharmacology	October, 2008
German/USA Collaborative Computational Neurosciences Symposium LMU, Munich	June, 2008
Stanford University, Frontiers in Neuroscience	May, 2008
INI, ETH Zurich	April, 2008
UT Austin Center for Learning and Memory	February, 2008

UC San Diego, Neuroscience Student Speaker	December, 2007
Wiersma Lecture, Caltech	June, 2007
MPI Behavioral Physiology, Seewiesen, Germany	June, 2007
Bernstein Colloqium, LMU, Munich, Germany	June, 2007
University of Pittsburgh	February, 2007
Penn State University	April, 2006
Mead-Johnson National Clinical Scholars Program	April, 2006
California Institute of Technology	March, 2006
Columbia University	March, 2006
Harvard University, Department of Neurobiology	December, 2005
UCLA Joint Seminars in Neuroscience	November, 2005
Frei University, Berlin, Symposium Speaker	October, 2005
6th Internat'l W'shop on Auditory Processing	September, 2005
Woods Hole Neural Systems and Behavior	July, 2005
Princeton University	May, 2005
Auckland, New Zealand	March, 2005
Cornell University, Department of Psychology	September, 2004
Council of Visitors Meeting, Woods Hole MBL	June, 2004
Symposium on Central Auditory Function, Plasticity & Disorders, Jackson Hole, WY	June, 2004
University of Pennsylvania, Dept. of Neurobiology	April, 2004
University of Texas at Austin, Biology	April, 2004
University of California at Irvine, Neurobiology	April, 2004
Florida State University, Biology	March, 2004
Keynote Speaker, Southeastern Nerve Net	March, 2004
Dart Foundation, Scholar in Residence MBL, Woods Hole	August, 2003
Woods Hole Neural Systems and Behavior	July-August, 2003
University of Chicago, Neuroethology Symposium	June, 2003
University of Minnesota	May, 2003
Brown University	April, 2003
University of Southern California	February, 2003

University of Alabama at Birmingham	February, 2003
Hunter College Birdsong Symposium	December, 2002
Carnegie Institute, Washington DC	October, 2002
Gordon Conference, Neuroethology, Oxford Univ.	August, 2002
Woods Hole Neural Systems and Behavior	July-August, 2002
UC San Diego, Department of Biology	May, 2002
Wesleyan University, Department of Biology	April, 2002
Indiana University, Department of Psychology	April, 2002
Cornell University	April, 2002
Woods Hole Neural Systems and Behavior	July-August, 2001
Gordon Conference, Neural Plasticity, RI	July, 2001
New York University, Biennial Symposium	June, 2001
German Neurobiology Conference, Gottingen	June, 2001
Johns Hopkins Dept. of Psychology	April, 2001
Washington University	November, 2000
Rockefeller University	October, 2000
University California at Davis	September, 2000
California Institute of Technology	September, 2000
Middlebury College	April, 2000
Northwestern University	February, 2000
University of Chicago	February, 2000
University of Maryland	February, 2000
University of Pittsburgh	November, 1999
Gordon Conference, Developmental Biology	June, 1999
Harvard University, Department of Neurobiology	November, 1998
Rockefeller University	October, 1998
Bell Labs Neural Systems Group	October, 1998
NIMR, Developmental Biology, London	September, 1998
University of Frankfurt, Max Planck	September, 1998
McKnight Conference, Aspen, CO	April, 1998
Bowman Gray Department of Neurobiology	March, 1998

Keystone Symposium, Park City, Utah	March, 1998
Dahlem Conference, Berlin	January, 1997
German Neurobiology Conference, Gottingen	June, 1997
University of Achen, Germany	June, 1997
University of Kaiserslautern, Germany	June, 1997
Seewiesen Insitute, Germany	June, 1997
University of Milan, Italy	June, 1997
University of Pennsylvania	March, 1996
Guy's Hospital, London, UMDS Research Day	November, 1995

Teaching responsibilities including continued education:

NBI 351	Neuroscience Bootcamp, Founding Co-Organizer, 2010-2015
NBI 322	Course Director, Concepts in Neuroscience II, 2005-2013
NBI 325	Frontiers in Neuroscience, 2005-present
NBI 202	Medical School Neurobiology, Director, 2001-2006; Lecturer 1994-2008; Lab instructor, 1994-2008.
NBI 359	Auditory Systems, 2003
NBI 211	Developmental Neurobiology, 2000
NBI 209	Systems Neurobiology, 1997
	Neural Systems and Behavior, MBL, 2001-2003, 2005

Trainees

Postdoctoral Trainees	Training Period	Position
Thomas Harmon	2018-present	Current Trainee
Audrey Mercer	2017-present	Current Trainee
Mor Ben-Tov	2015-present	Current Trainee
Katherine Tschida	2014-present	Current Trainee
Masashi Tanaka	2013-2018	Tohoku University
David Schneider, Ph.D.	2012-2017	Assistant Professor, NYU
Timothy Warren, Ph.D.	2014-2016	Postdoc, Doe Lab, HHMI
Anders Nelson	2015	Postdoc, Columbia Univ.
Wendy Peh	2014-2015	Postdoctoral Fellow, NUS
Kosuke Hamaguchi, Ph.D.	2008-2014	Associate Professor Kyoto University
Todd Roberts, Ph.D.	2004-2012	Assistant Professor UT Southwestern
Jon Prather, Ph.D.	2004-2010	Associate Professor University of Wyoming
Stephen Shea, Ph.D.	2005-2010	Associate Professor Cold Spring Harbor Labs
Yoram Ben-Shaul, Ph.D.	2005-2009	Assistant Professor The Hebrew University of Jerusalem
Eric Bauer, Ph.D.	2003-2006	Assistant Professor Elon University
Melissa Coleman, Ph.D.	2001-2005	Associate Professor Claremont College
Yoko Yazaki-Sugiyama, Ph.D.	2001-2003	Associate Professor

		OIST, Japan
Christopher Sturdy, Ph.D.	1999-2002	Professor Univ. Alberta
Stephanie White, Ph.D.	1997-2000	Professor, UCLA
John Spiro, Ph.D.	1995-2000	Deputy Scientific Director, SFARI Simmons Foundation

Doctoral Trainees	**Training Period**	**Position .**
Jiaxuan Qi	2018-present	Current Trainee
Marios Tringides	2017-present	Current Trainee
Valerie Michael	2016-present	Current Trainee
Samuel Brudner	2015-present	Current Trainee
Jonnathan Singh Alvarrado	2015-present	Current Trainee
Matthew Kearney	2014-present	Current Trainee
Janani Sundarajanan	2013-present	Current Trainee
Erin Hisey	2012-2017	Postdoc, Duke University
Anders Nelson	2011-2015	Postdoc, Columbia University
Wendy Peh	2009-2014	Postdoc, NUS
Malavika Murugan	2008-2013	Postdoc, Princeton University
Katherine Tschida, Ph.D.	2007-2011	Postdoc, Duke University
Huimeng Lei, Ph.D.	2005-2009	Assistant Professor Beijing Capital University
Arani Roy, Ph.D.	2001-2007	Research Professor University of Minnesota
Merri Rosen, Ph.D.	1996-2002	Associate Professor Northeastern Ohio Medical College

J. Matthew Kittelberger, Ph.D.	1996-2001	Chair, Associate Professor Gettysburg College
Frederick Livingston, Ph.D.	1995-2000	Research Consultant Molecular Devices

Undergraduate (select)

Alina		
Olivia Zhu	2013-2015	Microsoft Corporation
Clara Starkweather	2010-2014	MSTP Harvard University
Rebecca Stacey	1999-2000	MD-PhD Washington University

Areas of research interests:

The synaptic, circuit, and network mechanisms of learning and memory, including the neural processes underlying vocal learning and auditory memory. Vocal communication. Audition. Sensorimotor integration. Musical perception. Learning. Memory. Behavior. Neurons. Synapses. Neural circuits. Neurophysiology. Imaging.

External support - gifts, grants, and contracts:

a. Past:

McKnight Foundation: "Cellular Mechanisms of Avian Vocal Learning and Memory" Richard Mooney, PI	$120,000 total direct costs	07/01/94-06/30/98
NIH DC002524 "Synaptic and Cellular Mechanisms of Avian Song Learning" Richard Mooney, PI	$555,296 total direct costs	01/01/95-6/30/00
The Esther A. & Joseph Klingenstein Fund, Inc. “The Role of Experience in the Formation of Inhibitory Circuits Controlling Learned Vocalizations in	$120,000 total direct costs	07/01/97-06/30/00

Song Birds”
Richard Mooney, PI

Alfred P. Sloan Foundation: $35,000 09/16/97-09/15/00
Richard Mooney, PI total direct costs

NIH DC002524 $705,000 07/01/00-06/30/05
"Mechanisms Underlying Song- total direct costs
Selectivity in Avian Neurons"
Richard Mooney, PI

5 R01 DC02524-15 7/1/05 – 6/30/10
Learned vocal representations in avian basal ganglia
Richard Mooney, PI

NIH DC04691 $864,500 08/20/01-05/31/06
“Cellular Mechanisms of Vocal- total direct costs
Respiratory Integration”
Richard Mooney, PI

NIH R21 $200,000 6/01/03-05/31/05
“Single Neuron Correlates of Learned total direct costs
Song”
Richard Mooney, PI

5 R01 DC005671-4 ~$900,000 4/1/03-3/31/08
“Dendritic remodeling in the olfactory bulb” total direct costs
Richard Mooney, PI

1 R21 DC009461-01 $250,000 12/1/08-11/30/11
NIH/NIDCD total direct costs
Optogenetic analysis of circuits for vocal recognition
Richard Mooney, PI

0821914 $800,000 08/01/08–07/31/14
NSF total direct costs
Structural dynamics of vocal learning
Richard Mooney, PI

5R21-NS079929-02 $250,000 05/01/12–10/30/14
NIH total direct costs
Miniature Microdrive for Intracellular Recordings in Freely Behaving Mice
Richard Mooney, PI

Hereditary Disease Foundation $35,000 10/01/13–09/30/14
Using songbirds to study how mutant forms of huntingtin affect learned motor skills.
Richard Mooney, PI

Trice Scholars Fund $50,000 10/01/13–09/30/14
Genetic, circuit and behavioral analysis of a human gene implicated in language learning disorders.
Richard Mooney, co-PI

5R01-DC002524-20 (Mooney) 7/1/10-6/30/2015
NIH
Sensorimotor Integration for Learned Behaviors
Richard Mooney, PI

DIBS Incubator proposal 7/1/16-6/30/2017
Neurogenesis and Behavioral Recovery in Animal Models of Huntington's Disease
The goal of this proposal is to examine whether and how newborn neurons can enable behavioral recovery following neuronal death in the basal ganglia triggered by Huntington's disease.

b. <u>Present</u>:

5R01-NS099288-03 (Mooney) 09/30/2016 – 06/30/2021
NIH/NINS $277,102 3.6 calendar
Mechanisms for Internally and Externally Guided Sensorimotor Learning
This project seeks to identify neural mechanisms that contribute to internally and externally reinforced forms of motor learning.

5R01-DC013826-04 (Mooney) 12/01/2014 – 11/30/2019
NIH/NIDCD $212,500 3.6 calendar
Motor Modulation of Auditory Processing
The goal of this project is to determine the circuit mechanisms by which motor-related signals influence auditory cortical processing.

1354962 (Mooney) 08/15/2014 – 07/31/2019
NSF $530,000 1.3 calendar
Neural Codes for Vocal Sequences
The goal of this project is to determine how auditory and motor representations of learned vocal sequences are encoded in a sensorimotor structure important to learned vocalizations in songbirds.

1R01-MH117778-01 (Wang/Mooney) 7/11/2018-04/30/2023
NIH $334,330 1.8 calendar
Using Genetic Tools to Dissect Neural Circuits for Social Communication

The major goal of this multi-PI project is to use a novel genetic approach to selectively tag neurons that are active during social encounters that elicit vocalization. We will combine this innovative method with in vivo imaging, electrophysiology, chemical and optogenetic perturbations of neural activity, and behavioral measurements to identity neural circuits that facilitate expressive and receptive aspects of vocal communication in the service of social affiliation.

c. <u>Pending or Planned</u>:

(Mooney; Awarded) 09/01/2018– 06/30/2020
University of Colorado Denver / NIH $38,082 0.36 calendar
Controlled Neuronal Firing In Vivo Using Two Photon Spatially Shaped Optogenetics
The major goal of this project is to express genetically-encoded calcium indicators (i.e., GECIs) in sensorimotor neurons important to vocal communication if singing birds. We will image the activity of neurons during singing, align fluorescence signals to the onset of individual songs and syllables within those songs, to derive a spatiotemporal map of motor-related activity.

1T32-NS105608-01A1 (Mooney; Pending) 09/01/2019 – 8/31/2024
NIH $542,073 2.1 calendar
Neurobiology Training Program
Basic pre-doctoral training in neuroscience. The goal of the program is to train a new generation of scientists, well versed in standard techniques, but loaded with the imagination and insights that equip them to push across discipline boundaries in search of new and deeper understandings of the basis of nervous system function in health and disease.

5R01-DC013826-06 (Mooney; Planned) 12/01/2019 – 11/30/2024
NIH/NIDCD $250,000 3.6 calendar
Motor Modulation of Auditory Processing
The goal of this project is to determine the circuit mechanisms by which motor-related signals influence auditory cortical processing.

Participation in academic and administrative activities of the University and Medical Center:

The President's Arts Planning Committee (2018-2019)

University Provost's Academic Planning Committee (2012-2014)

Medical School APT Committee (2013-2016)

Williams Faculty Research Prize Selection Committee (2012-2018)

Director of Graduate Studies (2009-2018)

Neurobiology Graduate Program Admissions Committee (current)

Neurobiology Graduate Program Steering Committee (current)

Neurobiology Chair Search Committee (2011)

Departmental Faculty Search Committees (10)

Development Initiatives Committee (2010)

Neurobiology Space Committee (2008-2011)

Duke Institute of Brain Sciences Executive Committee (past)

Basic Sciences Faculty Steering Committee (Dept. Representative 2005-06)

Biological Sciences Task Force (2006-2007)

Katz Lab Memorial Prize Committee (2006-present)

Faculty Compensation Committee (2007-2008)

Neuroscience Major Advisory Committee (2007-2008)

Master Teacher Selection Committee (2007, 2008)

Personal Information

Home address: 1604 Woodburn Rd., Durham, NC

Tel. number: (919) 489-5650

Marital status: Married

Name of spouse: Julie Mooney

Degrees: B.S., Ph.D.

Children: Justin Larson, 27y, stepson

Community activities and personal interests: Music; fishing; entomology; gardening; hiking; swimming; natural history; reading; cooking.