

**CURRICULUM VITAE****Michael R. Markham**

Department of Biology  
The University of Oklahoma  
730 Van Vleet Oval, Room 314  
Norman, OK 73019

tel (405) 325-6760  
fax (405) 325-6202  
markham@ou.edu  
www.michaelmarkham.net  
www.markhamlab.com

**Date of Birth:** November 14, 1968

**Citizenship:** United States

**Education**

1986-1990 BA, Psychology *summa cum laude*, University of New Mexico  
1990-1991 MS, Psychology *with distinction*, University of New Mexico  
1991-1994 Ph.D., Psychology, University of New Mexico

**Postdoctoral Training**

2003 Neural Systems & Behavior summer course, Marine Biological Laboratory  
2001-2006 Neurobiology, Florida International University, with Philip Stoddard  
2006-2011 Neurobiology, The University of Texas at Austin, with Harold Zakon

**Professional Positions since Ph.D.**

2013-... Graduate Faculty, Dept. of Neuroscience, Univ. of Oklahoma Health Sciences Center  
2015-... Case-Hooper Associate Professor, Department of Biology, The University of Oklahoma  
2011-2015 Case-Hooper Assistant Professor, Department of Biology, The University of Oklahoma  
2008-2011 Lecturer, School of Biological Sciences, The University of Texas at Austin,  
2006-2011 Research Scientist, Section of Neurobiology, The University of Texas at Austin  
2002-2006 Research Assoc. Professor, Dept. Biological Sciences, Florida International University  
1994-2002 Assistant Professor, Department of Psychology, Florida International University

**Research Interests**

- Neurobiology of animal communication systems
- Real-time relationships between behavior, ion channels, and excitable cell plasticity
- Energetic constraints on animal communication systems

**External Funding (All as sole PI)**

NSF IOS 1350753 (2014-2019) \$719,286, CAREER: The energetic costs of active sensory and communication signals: Integrating research and education through organismal, cellular, and molecular approaches.

NSF IOS 1257580 (2013-2016) \$379,351, Cellular mechanisms of rapid hormonal modulation in vertebrate communication signals.

NINDS 1R01NS069881 (2009; 19<sup>th</sup> percentile as new investigator / not funded) \$1.25M, Sexual dimorphism of intrinsic plasticity in excitable cells.

NIMH 1K01MH064550 (2003 - 2008) \$594,000, Ion channels in regulation of excitable membranes.

NIGMS S06GM08205 (1998 - 2000) \$223,000, An animal model of arbitrary stimulus classes and class-based transfer of stimulus functions.

**Internal Funding**

University of Oklahoma Faculty Senate, Ed Cline Faculty Development Award (2013) \$2000, Development of public domain instructional software for neuroscience classes.

University of Oklahoma Research Council (2012) \$15,000, Transcriptome analysis of ion channel structure and function.

Florida International University Faculty Development Grant (1996) \$800.00, Subconscious operant conditioning of an imperceptible myoelectrical response.

University of New Mexico Research Allocations Committee (1993) \$3461.00, Emergent stimulus relations in rats.

Sigma Xi Grants-in-Aid-of-Research (1991) \$400.00 Comprehensive investigation of complex stimulus relations and transfer of function in human subjects.

### **Honors and Awards**

2014 Irene Rothbaum Outstanding Assistant Professor Award, OU College of Arts & Sciences

2010 Young Investigator Award, International Society for Neuroethology

1991-1994 Ford Foundation Predoctoral Fellowship

1994 Graduate Student Valedictorian, University of New Mexico

1994 Benjamin F. Haught Memorial Research Lecture, University of New Mexico

1994 Association for Behavior Analysis, Experimental Analysis of Human Behavior Special Interest Outstanding Student Paper Award

1993 Outstanding Graduate Student Researcher, University of New Mexico

1990 Phi Beta Kappa

### **Manuscripts in Preparation**

**Markham MR**, Rodriguez CM, Huguenard JR (in preparation). Electrophysiology of the Neuron 2014: Open access neural simulation software to promote active learning in neurobiology.

### **Publications – Neurobiology**

Ban Y\*, Smith BE, **Markham MR** (2015). A highly-polarized excitable cell separates sodium channels from sodium-activated potassium channels by more than a millimeter. *Journal of Neurophysiology*. Doi:10.1152/jn.00475.2014 \*graduate student

Sinnett PM\*, **Markham MR** (2015) Food restriction reduces the amplitude of an active sensory and communication signal in a weakly electric fish. *Hormones and Behavior*, 71, 31-40.  
\*undergraduate student

**Markham MR**, Zakon HH (2014) Ionic Mechanisms of microsecond-scale spike timing in single cells. *The Journal of Neuroscience* 34: 6668-6678.

Lewis JE, Gilmour KM, Moorhead MJ, Perry SF, **Markham MR** (2014) Action potential energetics at the organismal level reveal a trade-off in efficiency at high firing rates. *The Journal of Neuroscience* 34: 197-201. (Selected by the editor to be highlighted in the journal's "This week in the journal" feature.)

**Markham MR**, Stoddard PK (2013) Cellular mechanisms of developmental and sex differences in the rapid hormonal modulation of a social communication signal. *Hormones and Behavior* 63: 586-597.

**Markham MR** (2013) Electrocyte physiology: 50 years later. *The Journal of Experimental Biology* 216: 2451-2458.

**Markham MR**, Kaczmarek LK, Zakon HH (2013) A sodium-activated potassium channel supports high-frequency firing and reduces energetic costs during rapid modulations of action potential amplitude. *Journal of Neurophysiology* 109: 1713-1723.

**Markham MR**, McAnelly ML, Stoddard PK, Zakon HH (2009) Circadian and social cues regulate ion channel trafficking. *PLoS Biology* 7: e1000203.

- Markham MR**, Allee SJ, Goldina A, Stoddard PK (2009) Melanocortins regulate the electric waveforms of gymnotiform electric fish. *Hormones and Behavior* 55: 306-313.
- Allee SJ, **Markham MR**, Stoddard PK (2009) Androgens enhance plasticity of an electric communication signal in female knifefish, *Brachyhypopomus pinnicaudatus*. *Hormones and Behavior* 56: 264-273.
- Stoddard PK, **Markham MR** (2008) Signal Cloaking by Electric Fish. *Bioscience* 58: 415-425.
- Allee SJ, **Markham MR**, Salazar VL, Stoddard PK (2008) Opposing actions of 5HT(1A) and 5HT(2)-like serotonin receptors on modulations of the electric signal waveform in the electric fish *Brachyhypopomus pinnicaudatus*. *Hormones and Behavior* 53: 481-488.
- Stoddard PK, **Markham MR**, Salazar VL, Allee S (2007) Circadian rhythms in electric waveform structure and rate in the electric fish *Brachyhypopomus pinnicaudatus*. *Physiology and Behavior* 90: 11-20.
- Stoddard PK, Zakon HH, **Markham MR**, McAnelly L (2006) Regulation and modulation of electric waveforms in gymnotiform electric fish. *Journal of Comparative Physiology A, Sensory, Neural, and Behavioral Physiology* 192: 613.
- Markham MR**, Stoddard PK (2005) Adrenocorticotrophic hormone enhances the masculinity of an electric communication signal by modulating the waveform and timing of action potentials within individual cells. *The Journal of Neuroscience* 25: 8746-8754.
- Stoddard PK, **Markham MR**, Salazar VL (2003) Serotonin modulates the electric waveform of the gymnotiform electric fish *Brachyhypopomus pinnicaudatus*. *Journal of Experimental Biology* 206: 1353-1362.
- Publications - Basic and Applied Psychology**
- Markham RG, **Markham MR** (2002) On the role of covarying functions in stimulus class formation and transfer of function. *Journal of the Experimental Analysis of Behavior* 78: 509-525.
- Markham MR**, Dougher MJ, Augustson EM (2002) Transfer of operant discrimination and respondent elicitation via emergent relations of compound stimuli. *The Psychological Record* 52: 325-350.
- Lumpkin PW, Silverman WK, Weems CF, **Markham MR**, Kurtines WM (2002) Treating a heterogeneous set of anxiety disorders in youths with group cognitive behavioral therapy: A partially nonconcurrent multiple-baseline evaluation. *Behavior Therapy* 33: 163-177.
- Augustson EM, Dougher MJ, **Markham MR** (2000) Emergence of conditional stimulus relations and transfer of respondent eliciting functions among compound stimuli. *The Psychological Record* 50: 745-770.
- Markham MR**, Gallogly RH (1997) Does language make humans more than clever apes? *Journal of Applied Behavior Analysis* 30: 185-186.
- Peláez-Nogueras M, Gewirtz JL, **Markham MR** (1996) Infant vocalizations are conditioned both by maternal imitation and motherese speech. *Infant Behavior and Development* 19: 670-671. (published abstract)

- Roth WE, Gewirtz JL, **Markham MR** (1996). Maternal Attention to a Twin Sibling Evokes, and Contingent Maternal Attention Reinforces Jealous Behavior in Twin Infants. *Infant Behavior & Development*, 19, 206. (published abstract)
- Markham MR**, Butt AE, Dougher MJ (1996) A computer touch-screen apparatus for training visual discriminations in rats. *Journal of the Experimental Analysis of Behavior* 65: 173-182.
- Markham MR**, Branscum E, Finlay C, Roark R (1996). Experimental analysis of respondent conditioning in humans. *Experimental Analysis of Human Behavior Bulletin*, 14, 7-10.
- Dougher MJ, **Markham MR** (1996). Stimulus classes and the untrained acquisition of function. T. R. Zentall and P. M. Smeets (Eds.) *Advances in Psychology Series: The Formation of Stimulus Classes*. North Holland: Elsevier Science Publishers.
- Greenway DE, Dougher MJ, **Markham MR** (1995). S+/S- reversal procedures may not result in functional equivalence. *Experimental Analysis of Human Behavior Bulletin* 13: 16-17.
- Markham MR** (1995). Truth, philosophy and behavioral science: A reply to Hocutt. *Behavior and Philosophy*, 23, 73-78.
- Dougher MJ, Augustson EM, **Markham MR**, Greenway DE, Wulfert E (1994). The transfer of respondent eliciting and extinction functions through stimulus equivalence classes. *Journal of the Experimental Analysis of Behavior*, 62, 331-351.
- Dougher MJ, **Markham MR** (1994). Stimulus equivalence, functional equivalence, and the transfer of function. In S. C. Hayes, M. Sato, L. Hayes, & K. Ono (Eds.), *Language and Cognitive Events: A Behavior Analytic Perspective*. Reno, NV: Context Press.
- Augustson EM, **Markham MR**, Dougher MJ (1994). A methodological note regarding human classical conditioning. *Experimental Analysis of Human Behavior Bulletin* 12: 6-7.
- Markham MR**, Dougher MJ (1993). Compound stimuli in emergent stimulus relations: Extending the scope of stimulus equivalence. *Journal of the Experimental Analysis of Behavior* 60: 529-542.
- Markham MR** (1993). An interface for controlling external devices via the IBM PC/XT/AT parallel port. *Behavior Research Methods, Instruments, & Computers* 25: 477-478.
- Markham MR**, Dougher MJ, Wulfert E (1993). Social contingencies and the effects of punishment in alcoholics and nonalcoholics. *Behavior Therapy* 24: 277-284.
- Markham MR**, Miller WR, Arciniega L (1993) BACCuS 2.01: Computer software for quantifying alcohol consumption. *Behavior Research Methods, Instruments, & Computers* 25: 420-421.

### **Undergraduate Textbook**

- Purdy JE, **Markham MR**, Schwartz BL, Gordon WC (2001). *Learning and memory (2e)*. Pacific Grove, CA: Brooks/Cole. (now Cengage Learning)

### **Invited Seminars**

- 2015 Keynote address to Concord University's annual Undergraduate Research Day: "The costs of active sensory and communication signals in electric fish: From behavior to molecules."
- 2014 University of Oklahoma Health Sciences Center.  
Shocking tales of electric fish with insights on the function and dysfunction of neural systems.
- 2014 Colorado State University  
Energetics of bioelectric signaling in weakly electric fish.

- 2014 University of Texas  
Energetics of active sensory and communication signals in weakly electric fish.
- 2013 Wichita State University  
Circadian and social cues regulate ion channel trafficking in electric fish.
- 2012 New Mexico State University  
Circadian and social cues regulate ion channel trafficking in electric fish.
- 2011 Bernstein Center for Computational Neuroscience, Munich, Germany.  
Circadian and social cues regulate ion channel trafficking in electric fish.
- 2010 Hunter College / City University of New York  
Fish control the costs of their electric serenades by regulating ion channel trafficking.
- 2009 Department of Biology, Sam Houston State University  
Social and circadian cues regulate ion channel trafficking in an electric fish.

### **Invited Conference Presentations**

- Markham MR** (2014, July; cancelled by organizers). Energetics of active sensory and communication systems: Integrating organismal, cellular, and molecular perspectives. Invited address for the workshop, "The Work of Energy and Resource Allocation in Neural Systems" Hokkaido, Japan.
- Markham MR** (2011 August) Neural networks and communication: Integrating neuroethology and computational neuroscience. Invited Discussion Leader. The Gordon Research Seminar in Neuroethology, Easton MA, Stonehill College.
- Markham MR** (2010, August). Circadian and social cues regulate ion channel trafficking. Invited address to the International Congress of Neuroethology, Salamanca, Spain.
- Markham MR** (1997, October). Puzzles and possibilities: Stimulus classes, respondent conditioning and the experimental analysis of human behavior. Invited address presented at the annual convention of the Southeastern Association for Behavior Analysis, Chapel Hill, NC.
- Markham MR** (1995, February). Control by complex stimuli: Toward a theory of stimulus equivalence. Invited address presented at the annual convention of the Northern California Association for Behavior Analysis, Oakland, CA.
- Markham MR**, Dougher MJ (1992, June). Compound stimuli in emergent stimulus relations: Toward a unified theory of stimulus equivalence. Invited address presented at the Fifteenth Symposium on Quantitative Analyses of Behavior, Cambridge, MA.
- Dougher MJ, **Markham MR** (1992, June). Stimulus equivalence, functional equivalence, and the transfer of function. Paper presented at the 4th Verbal Relations Institute, Fuji Zakaraso, Japan.

### **Contributed Conference Presentations (Oral)**

\* Asterisks indicate undergraduate authors

- Markham MR**, Ban Y, Smith BE, \*Sinnott, PM (2015, April). Two views on the energetics of EOD production in *Eigenmannia virescens*. Annual Electrosensory Meeting, Montreal, QC, Canada.
- Markham MR** (2014, November). Energetics of active sensory and communication signals in the weakly electric fish *Eigenmannia virescens*: organismal, cellular, and molecular perspectives. Annual meeting of the J.B. Johnston Club for Evolutionary Neuroscience. Washington, DC.

- Riedmann HL, \*Ahadizadeh EN, Maltby R, Zheng F, **Markham MR** (2014, April) Molecular adaptations of the Na<sup>+</sup>/K<sup>+</sup> ATPase in gymnotiform electrocytes. Annual Electrosensory Meeting, Montreal, QC, Canada.
- Ban Y, Smith BE, **Markham MR** (2014, April) Fine morphology of *Eigenmannia virescens* electrocytes with localization of ion channels and ion transporters. Annual Electrosensory Meeting, Montreal, QC, Canada.
- Markham MR**, \*Sinnott PM, Ban Y, \*Ahadizadeh EN (2014, January) Energetics of active sensory and communication signals in the weakly electric fish *Eigenmannia virescens*: Organismal, cellular, and molecular perspectives. Annual meeting of the Society for Integrative and Comparative Biology, Austin TX.
- Markham MR** (2013, April). Energetics of electrical signaling in fish: A cellular perspective. Annual electrosensory meeting, Montreal, QC, Canada.
- Markham MR**, Kaczmarek LK & Zakon HH. (2012, August). A sodium-activated potassium channel in the electric organ of *Eigenmannia virescens* maintains high action potential frequencies and reduces energetic costs. Weakly Electric Fish satellite of the International Congress of Neuroethology, College Park, MD.
- Markham MR** (2011, May). Ionic mechanisms of microsecond-scale spike timing in gymnotiform electrocytes. Annual electrosensory meeting, Montreal, QC, Canada.
- Markham MR**, McAnelly ML, Stoddard PK, Zakon HH (2008, November). Peptide hormones enhance an electric communication signal via a cAMP/PKA pathway that regulates ion channel trafficking. Paper presented at the annual meeting of the J.B. Johnston Club, Washington, DC.
- Stoddard PK, **Markham MR** (2006, June) Evolution from obsolete parts: signal plasticity in electric communication. Symposium on the evolution of sensory and signaling systems, Animal Behavior Society, Snowbird Resort, Salt Lake City.
- Finlay CG, **Markham MR** (1998, May). Respondent effects of aversive stimulation in humans. Paper presented at the annual convention of the Association for Behavior Analysis, Orlando, FL.
- Roth WE, \*Matos M, \*Rodriguez IM, **Markham MR** (1997, May). The use of public posting and performance lotteries to improve the quality of staff-resident interactions in geriatric nursing homes. Paper presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Alexander S, Gewirtz JL, Lubin D, **Markham MR**, Silverman W (1997 May). Antecedent reinforcement schedule exposure can determine responding denoting self-control. Paper presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Markham MR**, Finlay CG (1997, August). Dissociations in the interaction of Pavlovian conditioning and stimulus classes. Address presented at the Division 25 meeting, annual convention of the American Psychological Association, Chicago, IL.
- Markham MR**, Dougher MJ (1995, May). Transfer of operant discrimination and respondent elicitation via emergent relations of compound stimuli. Paper presented at the annual convention of the Association for Behavior Analysis, Washington, DC.
- Markham MR** (1994, May). Resisting repression post-Skinner: Staying the course of American Pragmatism. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR**, Dougher MJ (1994, May). Conditional vs. compound stimulus control in complex human behavior. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.

- Markham MR**, Augustson EM, Dougher MJ, Hackbert, L. (1994, May). Transfer of respondent elicitation via emergent relations of compound stimuli. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR**, Butt AE, & Dougher MJ (1994, May). Using touch-screen technology to train serial reversals of concurrent visual discriminations in hooded rats. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR**, Hackbert L, Augustson EM, & Dougher MJ (1994, May). Increased task difficulty as an unconditioned stimulus in classical conditioning with human subjects. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR** (1993, May). Compound stimuli and emergent stimulus relations. Invited address presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Markham MR** (1993, May). Transcending transcendence in the quest for epistemology. Paper presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Markham MR**, Dougher MJ, Butt AE, Augustson EM (1993, May). Work in progress: Looking for emergent stimulus relations in albino rats. Paper presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Perkins DR, Dougher MJ, **Markham MR** (1993, May). Rule governed and contingency shaped stimulus classes: Sensitivity to different degrees of change. Paper presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Augustson EM, Dougher MJ, **Markham MR** (1993, May). The transfer of CER eliciting and extinction functions via stimulus equivalence classes. Paper to be presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Markham MR** (1992, October). The truth about contextualism. Paper presented at the Annual International Congress on Behaviorism and the Sciences of Behavior, Guadalajara, Mexico.
- Greenway DE, Dougher MJ, **Markham MR** (1992, October). Functional vs. stimulus equivalence. Paper presented at the Annual International Congress on Behaviorism and the Sciences of Behavior, Guadalajara, Mexico.
- Perkins DR, Dougher MJ, **Markham MR** (1992, October). Degree of insensitivity as a function of change in rule governed equivalence classes. Paper presented at the Annual International Congress on Behaviorism and the Sciences of Behavior, Guadalajara, Mexico.
- Markham MR** (1992, May). Interpretive behaviorism and methodological anarchy. Paper presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- Markham MR**, Dougher MJ, \*Schwartz K (1992, May). Emergence of contextual, conditional and discriminative stimulus functions via sequence training. Paper presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- Perkins DR, **Markham MR**, Dougher MJ (1992, May). Transfer of function via rule governed stimulus classes. Paper presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- Perkins DR, **Markham MR**, Dougher MJ (1992, May). Emergence of stimulus functions in the five-term contingency: Empirical findings and theoretical implications. Paper presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- Markham MR**, Dougher MJ, Wulfert E (1991, November). Social contingencies and the effects of punishment in alcoholics and nonalcoholics. Paper presented at the annual convention of the Association for the Advancement of Behavior Therapy, New York, NY.

- Markham MR** (1991, May). Wittgenstein's *On Certainty* and its relevance for radical behaviorism. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR & Dougher MJ** (1991, May). Expanding stimulus equivalence to include the Associative Relationship: Effects of training with compound stimuli. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR, Dougher MJ, Greenway DE** (1991, May). DrawEquiv II: An improved computer program for graphing equivalence data. Poster presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR, Augustson EM, Dougher MJ** (1991, May). Transitivity and symmetry with compound stimuli. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR, Dougher MJ** (1991, May). Social contingencies and the effects of punishment in alcoholics. Paper presented at the annual convention of the Association for Behavior Analysis, Atlanta, GA.
- Markham MR** (1990, May). Scrutinizing the hand that feeds: Theoretical issues in the experimental analysis of logic and reasoning. Paper presented at the annual convention of the Association for Behavior Analysis, Nashville, TN.
- Markham MR** (1990, May). Induction as a distinguishing characteristic of radical behaviorism. Paper presented at the annual convention of the Association for Behavior Analysis, Nashville, TN.
- Markham MR, Greenway DE, Dougher MJ** (1989, May). Pathfinder analysis of equivalence data: Structural representations of functional relationships. Paper presented at the annual convention of the Association for Behavior Analysis, Milwaukee, WI.

### **Posters Presented at Regional, National, and International Conferences**

\* Asterisks indicate undergraduate authors

- Joos B, **Markham MR**, Lewis JE, Morris CE. (2015, February). The energetics of high frequency discharge in electrocytes: A mathematical model with explicit pumps. Annual meeting of the Biophysical Society, Baltimore MD.
- Riedmann HL, \*Ahadzadeh EN, Maltby R, **Markham MR**. (2014, January). Comparative analysis of Na<sup>+</sup>/K<sup>+</sup> ATPase alpha subunits from the electric organs of weakly electric fish with low and high discharge rates. Annual meeting of the Society for Integrative and Comparative Biology, Austin TX.
- Markham MR** (2014, January) Electrophysiology of the Neuron 2014: Open access neural simulation software to promote active learning in neurobiology. Annual meeting of the Society for Integrative and Comparative Biology, Austin TX.
- Markham MR, Kaczmarek LK, Zakon HH** (2012, November). A sodium-activated potassium channel maintains high action potential frequencies and reduces energetic costs during rapid modulations of action potential amplitude in a weakly electric fish. Poster presented at the annual meeting of the Society for Neuroscience. Washington, DC.
- Markham MR, Kaczmarek LK, Zakon HH** (2012, August) Ultra-rapid sodium channel kinetics and a sodium-activated potassium channel maintain high action potential frequencies during rapid modulations of action potential amplitude in a weakly electric fish. International Congress for Neuroethology, College Park, MD.
- Markham MR, Stoddard PK** (2010, August). Cellular mechanisms of developmental and sex differences in plasticity of a social communication signal. International Congress of Neuroethology, Salamanca, Spain.



- Markham MR**, McAnelly ML, Stoddard PK, Zakon, H.H. (2009, November). Circadian and social cues regulate ion channel trafficking. *Society for Neuroscience Abstracts*, Program No. 456.5
- Stoddard PK, Allee SJ, Goldina A, **Markham MR** (2007, July). Synergy between androgens and melanocortins in regulation of gymnotiform electric waveforms. International Congress for Neuroethology. Vancouver, British Columbia.
- Goldina A, **Markham MR**, Stoddard PK (2007, July). The evolution of electrifying diversity: melanocortins modulate communication signals differently across the order Gymnotiformes. International Congress for Neuroethology. Vancouver, British Columbia. July, 2007
- Goldina A, **Markham MR**, Stoddard PK (2006, October) Evolution of circadian and melanocortin-induced plasticity in the communication signals of Gymnotiform electric fish. *Society for Neuroscience Abstracts Program No. 579.8*.
- Markham MR**, Stoddard PK (2005, November) The melanocortin ACTH modulates an electric communication signal by modulating the waveform and timing of action potentials in individual cells. *Society for Neuroscience Abstracts Program No. 1001.8*.
- McAnelly ML, **Markham MR** (2005, November) ACTH modulates electrocommunication via effects on the electrocyte sodium current. *Society for Neuroscience Abstracts*, Program No. 205.1
- Markham MR**, Haskell-Luevano C, Stoddard PK (2004) A melanocortin receptor modulates electrocyte action potentials via a cAMP/PKA pathway. *Society for Neuroscience Abstracts*, Program No. 334.7
- Markham MR**, Stoddard PK (2003) A melanocortin receptor modulates the amplitude and repolarization time of electrocyte action potentials in male electric fish, *Brachyhypopomus pinnicaudatus*. *Society for Neuroscience Abstracts*, Program No. 828.16
- Salazar VL, **Markham MR**, Stoddard PK (2002) Serotonin rapidly enhances sexually dimorphic characters of the electric waveform of the gymnotiform electric fish *Brachyhypopomus pinnicaudatus*. *Society for Neuroscience Abstracts*, Program No. 87.8
- Finlay CG, **Markham MR** (1999, May). An investigation of respondent blocking by class-derived conditioned stimuli. Poster presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Haas AJ, \*Colbert CL, Portocarrero J, **Markham MR** (1999, May). Tests for functional equivalence and transitivity in long-evans rats. Poster presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- \*Aguilera C, **Markham MR** (1998, May). Compound stimulus discriminations and tests for emergent matching-to-sample in rats. Poster presented at the annual convention of the Association for Behavior Analysis, Orlando, FL.
- Crooks N, Pelaez-Nogueras M, Gewirtz JL, **Markham MR** (1998, May). Contingent relations description facilitates rule-following in a generalization task. Poster presented at the annual convention of the Association for Behavior Analysis, Orlando, FL.
- Finlay CG, \*Pacheco M, **Markham MR** (1997, May). Conditioned eyeblink elicitation does not transfer via equivalence relations. Poster presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Roth WE, \*Flores M, \*Botner T, **Markham MR** (1997, May). Using card-sort procedures to assess stimulus class formation. Poster presented at the annual convention of the Association for Behavior Analysis, Chicago, IL.
- Gallogly RH, Roth WE, \*Estrella JF, **Markham MR** (1996, October). Are Conditional Stimulus Control and Discriminative Stimulus Control Independent Processes? Poster presented at the annual convention of the Southeastern Association for Behavior Analysis, Wilmington, NC.

- Roth WE, Gallogly RH, Branscum EE, **Markham MR** (1996, October). Training Configurations of Baseline Conditional Discrimination Results in Differential Disruption of Stimulus Class Formation by Incongruent Simple Discrimination Training. Poster presented at the annual convention of the Southeastern Association for Behavior Analysis, Wilmington, NC.
- Branscum EE, Gallogly RH, \*Estrella J, **Markham MR** (1996, May). Disruption of Stimulus Equivalence Classes Following Functional Discrimination of Equivalence Class Members. Poster presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- \*Finlay CG, \*Roark R, Branscum EE, **Markham MR** (1996, May). Transfer of Conditioned Skin Conductance Responses via Within-Compound Stimulus Relations. Poster presented at the annual convention of the Association of Behavior Analysis, San Francisco, CA.
- \*Haas AJ, \*Frank JS, **Markham MR** (1996, May). Effects of Intertrial Timeout Following Incorrect Responses During Simultaneous Visual Discrimination Procedures in Rats. Poster presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- \*Isava D, Branscum EE, Roth WE, **Markham MR** (1996, May). Functional Equivalence Classes in Rats Following Serial Acquisitions of Novel Auditory Discriminations. Poster presented at the annual convention of the Association for Behavior Analysis, San Francisco, CA.
- \*Frank J, \*Haas AJ, Ehrenzweig D, **Markham MR** (1995, November). Serial reversals of concurrent visual discriminations in rats: Evidence for savings. Paper presented at the annual convention of the Southeastern Association for Behavior Analysis, Charleston, SC.
- Gallogly RH, \*Estrella J, \*Hyman J, Roth WE, **Markham MR** (1995, November). Can stimulus control of behavior occur without controlling subject's verbal behavior? Paper presented at the annual convention of the Southeastern Association for Behavior Analysis, Charleston, SC.
- \*Roark R, \*Finlay CG, Branscum EE, **Markham MR** (1995, November). Human skin conductance conditioning: Elicitation of skin-conductance responses by CS- following unreinforced presentations of CS+. Paper presented at the annual convention of the Southeastern Association for Behavior Analysis, Charleston, SC.
- \*Totan S, Branscum EE, **Markham MR** (1995, November). Differential eyeblink conditioning to visual stimuli in humans. Paper presented at the annual convention of the Southeastern Association for Behavior Analysis, Charleston, SC
- Friedman SD, Butt AE, Cooper BG, Hagen MH, **Markham MR**, Hodge GK. (1994). Delayed non-match to position performance is impaired in rats given high dose of methamphetamine. Society for Neuroscience Abstracts, 24, 203.

### **Undergraduate Courses Taught (Institution, Semesters taught)**

- Introduction to Neurobiology (OU, 3 semesters, <http://www.BIOL3833.net>)
- Neurobiology Laboratory (UT, 10 semesters, <http://www.bio365L.net> )
- Introduction to Psychology (FIU, 5 semesters)
- Introduction to the Experimental Analysis of Behavior (FIU, 11)
- Introduction to Biopsychology (FIU, 5)
- Advanced Behavior Analysis Lecture/Lab (FIU, 1)

### **Graduate Courses Taught**

- Neurobiology (OU, 1 semester)
- Introduction to Matlab Programming for Life Sciences (OU, )
- Biological Bases of Behavior (FIU, 2 semesters)
- Single-case Research Methods (FIU, 2)
- Theories of Learning (FIU, 1)
- History and Systems of Psychology (FIU, 1)
- Proseminar in Experimental Analysis of Behavior (FIU, 2)
- Neural Systems and Behavior, Marine Biological Laboratory, 2004

**Completed Graduate Students**

Maria Sotolongo (MS, 2000). Thesis: "Applying the response disequilibrium hypothesis to anxiety disorders in children."

Carlos Finlay (MS, 1999). Thesis: "Pavlovian blocking by stimulus class-based transfer of respondent elicitation."

**Current Graduate Students**

Yue Ban (Ph.D. program in Cellular and Behavioral Neurobiology)

Hilary Riedmann (Ph.D. program in Cellular and Behavioral Neurobiology)

**Service on Graduate Advisory Committees**

Huynh Le (current, Microbiology and Plant Biology, advisor Dr. Michael McInerney)

Nathan Wages (current, Health and Exercise Science, advisor Dr. Travis Beck)

Tian Yuan (current, Biology, advisor Dr. David McCauley)

Caitlin Crowder (current, Chemistry and Biochemistry, advisor Dr. Anthony Burgett)

Zhaozhe Hao (Ph.D. 2014, Biology, advisor Dr. Ari Berkowitz)

Bryan Crable (Ph.D. 2013, Microbiology and Plant Biology, advisor Dr. Michael McInerney)

**Service on Undergraduate Honors Thesis Committees**

Gretchen Scheel (BS 2015, advisor Dr. Susan Schroeder)

Matt Elson (BS 2014, advisor Dr. Ari Berkowitz)

Corinne Dinges (BS 2014, advisor Dr. Chris Lemon)

Zack McDonald (BS 2014, advisor Dr. Chris Lemon)

Monte Simms (BS 2013, advisor Dr. Randy Hewes)

**Completed Undergraduate Honors Students**

Chris Bender (BS 2015, Physics), 2 semesters, Will begin University of Texas - San Antonio School of Medicine Fall 2015

Filip Holy (BS 2014), 4 Semesters Will begin University of Oklahoma School of Medicine Fall 2015.

Christine Connolly (BS 2014), 4 Semesters, currently enrolled in medical school: University of Oklahoma School of Medicine

Shahn Ijaz (BS 2013), 3 Semesters, currently enrolled in medical school: University of Texas Medical School - Galveston

Vivek Koduri (BS, 2013), 3 Semesters, currently enrolled in medical school: University of Texas Health Science Center at Houston

Carolina Aguilera (BA, 1998). 3 Semesters, Ph.D. West Virginia University, currently in private practice.

Andrea Haas (BA, 1997), 3 Semesters, Ph.D. Iowa State University, currently assistant professor, Massasoit Community College, Brockton MA.

Connie Colbert (BS 1996), 4 semesters, Ph.D. University of Florida, currently Translational Research Coordinator, Holden Comprehensive Cancer Center, Iowa City, IA.

**Past undergraduate Research Assistants (OU only)**

Emily Ahadzadeh (BS 2014), 3 semesters, currently enrolled in medical school: Case Western Reserve University

Eric Leung (BS 2014), 3 semesters, currently enrolled in Ph.D program in Health Informatics: Oregon Health Sciences University

Shyam Javaji (BS 2013), 3 semesters, currently enrolled in medical school: The University of Texas Medical School - Galveston

Helen Vu (BS 2012), 3 semesters, currently enrolled in PharmD program: The University of Oklahoma Health Sciences Center

Philip Sinnett (BS 2012), 3 semesters, currently enrolled in medical school: Oklahoma State University College of Medicine

### **Current Undergraduate Honors Students**

Austin Budd May 2014 - present

### **Current Undergraduate Research Assistants**

Troy Young January 2015-present

Nicholas Simmons January 2015-present

### **Membership in Professional Associations**

American Physiological Society, 2014-present

Sigma Xi, 2012-present

Society for Integrative and Comparative Biology, 2010-present

Animal Behavior Society, 2010-present

Society for Behavioral Neuroendocrinology, 2010-present

Society for Neuroscience, 2001-present

International Society for Neuroethology 2003-present

J. B. Johnston Club for Neuroethology, 2001-present

Association for Behavior Analysis, 1987-2002

American Psychological Association, 1996 – 2001

### **Professional Service**

#### *Grant Reviewing*

Review panelist, National Science Foundation, 2013, 2014, 2015

Grant reviewer, National Science Foundation 2005, 2006, 2008, 2011, 2014

Grant reviewer, National Geographic Society, 2014

#### *Executive Boards*

Executive Board, The Oklahoma Center for Neuroscience, 2014-...

#### *Editorial Boards*

The Behavior Analyst, 1998-2001

Experimental Analysis of Human Behavior Bulletin, 1995-1998

#### *Program committees*

Association for Behavior Analysis Annual Convention Program Committee, 1997-2000

*Association for the Advancement of Behavior Therapy Annual Convention Local Arrangements Committee 1997*

#### *Manuscript reviewer*

Advances in Physiology Education, Behavioral Ecology and Sociobiology

Brain Behavior and Evolution (2), Brain Research

Frontiers in Cellular Neuroscience, Hormones and Behavior (3)

Journal of the Experimental Analysis of Behavior (3)

Journal of Behavior Therapy and Experimental Psychiatry

Journal of Neurophysiology, Journal of Applied Behavior Analysis

Neuroscience, The Behavior Analyst, The Psychological Record

#### *University Service*

Provost's Advisory Committee for General Education Oversight 2014-...

Planning Group for Consolidated Sequencing Facilities and Related Research and Collaboration (office of the Vice President for Research), 2014-...  
 Faculty Search Committee, Department of Astronomy, 2013-2014  
 Biology Representative, National Merit Scholars Recruitment Office, 2012-...  
 Minority Access to Research Careers fellowship selection committee, 2001-2006  
 Chair, Institutional Animal Care and Use Committee, 1995-1999  
 Member, Institutional Animal Care and Use Committee, 1999-2001  
 University Research Council, 1995-1997  
 Award committee, FIU Provost's office Research Project Funding Competition, 1997

#### *College Committee Service*

College of Arts & Sciences Curriculum Committee, 1994-1996

#### *Department Committee Service*

Chair, Biology Web Page and Publicity Committee, 2013-...  
 Histology Lab Renovation Committee, 2013-...  
 Neurobiologist Faculty Search Committee, 2011-2012  
 Graduate Studies Committee, 2011-2013  
 Undergraduate Awards Committee, 2011-2013  
 Steering Committee, Cellular and Behavioral Neurobiology Ph.D. Program, 2011-...  
 Chair, Human Subjects Review Committee, 1995-1998  
 Lifespan Development Ph.D. Committee, 1994-2001  
 Behavior Analysis MS Committee, 1994-2001

#### *Ad-hoc Service to the University and Department*

##### Presentations and Workshops

NSF CAREER proposal development workshop, OU Center for Research Program Development and Enhancement, April 2013  
 "How to Get a Faulty Job" Panel presentation:  
 Graduate Teaching Academy, April 2012  
 Biology Graduate Student Association, February 2012  
 Microbiology and Plant Biology / Biology Department, November 2012  
 Table tennis club faculty advisor, 2013  
 Pre-med committee interviewer, 2014  
 "How to study for biology" panel presentation February 2014

##### University-wide working advisory groups

Vice President for Research's STEM Education charrette, February 2013  
 Provost's Dream Degree design charrette, August, 2014

##### Host for Departmental Seminar speakers:

Daphne Soares, University of Maryland, February 2012  
 Len Kaczmarek, Yale University, November 2012  
 Ashlee Rowe, Michigan State University, January 2014  
 Will Crampton, University of Central Florida, April 2015

Arts and Sciences Commencement Ceremony, Biology Faculty Marshal  
 May 2012, December 2012, May 2013

University Commencement Faculty Marshal  
 May 2014

#### *Community Outreach and Service*

Faculty Senate Speakers Service, 2011-present  
 "Electric Fish Roadshow" - an educational outreach presentation and demonstration with electric fish.

Science Museum Oklahoma, 2012-2013

Rivermont Retirement Community, 2012-2013

Supervision of High School Interns from the science magnet program, Liberal Arts and Sciences Academy, Austin TX 2005-2006

Supervision of High-school Interns from Miami Dade Public Schools Advanced Academic Achievement Program, 1999-2001

Speaker to Psi Chi's annual graduate student workshop 1994-1999