

Adam Lee Weaver

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LONG-TERM RESEARCH PLANS

Comparative study of the heartbeat system of North American leeches.

- Characterize blood flow using video analysis under varying levels of physical activity.
- Map the active and passive components of the heartbeat system using MicroCT imaging.
- Characterize the central pattern generator neurons and their synaptic connections.
- Measure the relative phasing of heartbeat neuron activity in each species.

Biophysical model of the leech heartbeat system from neurons through blood flow.

- Record motor neuron outputs, resulting muscle contractile forces, and measure blood flow.
- Fit the data with mathematical equations and build a model that provides testable predictions.
- Investigate the role of sensory feedback in modulating blood flow in the heartbeat system model.

EDUCATION

1997 Simulations in Computational Neuroscience Workshop, Pittsburgh Supercomputer Ctr.
1995-2002 Ph.D., Neuroscience Program, Ohio Univ., Advisor: Dr. Scott Hooper
1994-1995 Ph.D. Student, Integrative Biology Program, UCLA, Advisor: Dr. Charles Taylor
1990-1994 B.A., Biology and Psych. Majors, Univ. of Delaware, Advisor: Dr. Robert Simons

PROFESSIONAL EXPERIENCE

2010-Present Assistant Professor, Department of Biology, Saint Michael's College
2008-2009 Assistant Professor, Div. of Basic Pharm. Sciences, Xavier Univ., Coll. of Pharmacy
2007-2008 Assistant Professor, Department of Biology, Xavier University of Louisiana
2005-2007 Postdoctoral Fellow, University of Washington, Otolaryngology Department
Spring 2004 Instructor, Spelman College, Biology Department
2002-2004 Postdoctoral Fellow, Emory University, Biology Department
1998-2002 Research Assistant, Ohio University, Department of Biological Sciences
1995-1998 Teaching Assistant, Ohio University, Department of Biological Sciences
1994-1995 Teaching Assistant, UCLA, Department of Integrative Biology
1993-1994 Teaching Assistant, University of Delaware, Department of Biological Sciences

PROFESSIONAL AFFILIATIONS

2010-Present Sigma Xi, The Scientific Research Society
2010-Present Society for Neuroscience (Vermont Chapter)
2009-Present Faculty for Undergraduate Neuroscience
2007-Present Tri Beta National Biological Honor Society
1996-Present Society for Neuroscience

UNIVERSITY AND ACADEMIC SERVICE

2010-Present Multicultural Programming Committee, Saint Michael's College
2010 Judge for Student Presentations, Society for Neuroscience (Vermont Chapter)
2010-Present Tri Beta National Biological Honor Society (Advisor), Saint Michael's College

- 2010 Tri Beta Chapter Presentation on Finding a Career Path and Pursuing Research, Saint Michael's College
- 2009 Center for the Advancement of Teaching Workshop Presentation: "Blackboard: Unleashing Its Power in the Classroom—Assessments (Tests & Surveys)," Xavier Univ.
- 2008-2009 Facilities and Resources Subcommittee, Xavier Univ., Coll. of Pharmacy
- 2008-2009 Self-Study Committee, Xavier Univ., Coll. of Pharmacy
- 2008-2009 East Coast Student Club (Advisor), Xavier Univ.
- 2007-2009 Center for the Advancement of Teaching Advisory Committee, Xavier Univ.
- 2005-2007 Minority Student Bioscience Experience, Univ. Washington
- 2005-2007 Brain Awareness Week, Univ. Washington
- 2005-2007 Postdoctoral Association, Univ. Washington
- 2002-2004 Exec. Committee (Appointed), Atlanta Chapter of the Soc. for Neuroscience
- 1999-2000 Graduate Council (Appointed), Ohio Univ.
- 1998-2001 Neuroscience Program Graduate Student Representative (Appointed), Ohio Univ.
- 1997 Stomatogastric Satellite Meeting, Joint Organizer, New Orleans
- 1996-1998 Biological Sciences Grad. Admissions Committee (Appointed), Ohio Univ.
- 1996-1997 Graduate Council (Appointed), Ohio Univ.

SCHOLARSHIPS AND AWARDS

- 2011-2012 Project Grant Award, Vermont Genetics Network, \$65,030 and two student grants (\$4,500 each; Awardees: Kristen Cowens & Danielle Shepard)
- 2010 VPAA Summer Research Grants, Saint Michael's College, \$1,978 for supplies and two student grants (\$3,700 each; Awardees: Amanda Willette & Kristen Cowens)
- 2008-2009 Teaching Lab Equipment & Materials Grant, Xavier University College of Pharmacy, \$43,100
- 2007-2008 Louisiana Cancer Research Consortium Grant, Xavier Univ., \$25,000 (declined)
- 2007-2008 MIE-STEM Faculty Mini-Grants, Xavier Univ. of Louisiana Center For Undergraduate Research, \$10,000 & student stipend
- 2005-2006 NRSA Training Grant, Univ. Washington School of Medicine
- 2002-2004 Fellowship in Research and Science Teaching, Emory Univ. School of Medicine
- 1996-1999 Ohio University Doctoral Teaching and Research Fellowship
- 1993-1994 Psi Chi Psychology Honor Society
- 1992-1994 University of Delaware Research Fellowship
- 1990-1994 National Merit Scholarship

MANUSCRIPTS SUBMITTED

REFEREED PUBLICATIONS (*: Authors contributed equally)

- IR Davenport, AL Weaver, JP Wourms (2011) A Novel Set of Structures Within the Elasmobranch, Ovarian Follicle. *J Morphol.* May 2011; 272(5):557–565.
- AL Weaver, RC Roffman, BJ Norris, RL Calabrese (2010) A Role for Compromise: Synaptic Inhibition and Electrical Coupling Interact to Control Phasing in the Leech Heartbeat CPG. *Front Behav Neurosci.* July 2010; 4(38):1-17.
- J Meitzen, AL Weaver, EA Brenowitz, DJ Perkel (2009) Plastic and stable electrophysiological properties of adult avian forebrain song-control neurons across changing breeding conditions. *J Neurosci.* May 2009; 29(20):6558-67.

- SL Hooper, E Buchman, AL Weaver, JB Thuma, KH Hobbs (2009) Slow conductances could underlie intrinsic phase-maintaining properties of isolated lobster (*Panulirus interruptus*) pyloric neurons. *J Neurosci*, Feb 2009; 29(6):1834-1845.
- BJ Norris*, AL Weaver*, A Wenning, PA Garcia, RL Calabrese (2007) A central pattern generator producing alternative outputs: Pattern, strength and dynamics of premotor synaptic input to leech heart motor neurons. *J Neurophysiol*, Nov 2007; 98:2992-3005.
- BJ Norris*, AL Weaver*, A Wenning, PA Garcia, RL Calabrese (2007) A central pattern generator producing alternative outputs: Phase relations of leech heart motor neurons with respect to premotor synaptic input. *J Neurophysiol*, Nov 2007; 98:2983-2991.
- BJ Norris*, AL Weaver*, LG Morris, A Wenning, PA Garcia, RL Calabrese (2006) A central pattern generator producing alternative outputs: temporal pattern of premotor activity. *J Neurophysiol*. 96(1):309-26.
- AL Weaver, SL Hooper (2003) Relating network synaptic connectivity and network activity in the lobster (*Panulirus interruptus*) pyloric network. *J Neurophysiol*. 90(4):2378-2386.
- JB Thuma, LG Morris, AL Weaver, SL Hooper (2003) Lobster (*Panulirus interruptus*) pyloric muscles express the motor patterns of three neural networks, only one of which innervates the muscles. *J Neurosci*. 23(26):8911-8920.
- AL Weaver, SL Hooper (2003) Follower Neurons in Lobster (*Panulirus interruptus*) Pyloric Network Regulate Pacemaker Period in Complementary Ways. *J Neurophysiol*. 89(3):1327-1338.
- NJ Hoover, AL Weaver, PI Harness, SL Hooper (2002) Combinatorial and cross-fiber averaging transform muscle electrical responses with a large random component into deterministic contractions. *J Neurosci*. 22(5):1895-1904.

NON-REFEREED FULL LENGTH PUBLICATION (REVIEW ARTICLE)

- SL Hooper, AL Weaver (2000) Motor neuron activity is often insufficient to predict motor response. *Curr. Opin. Neurobiol*. 10(6):676-682.

PUBLISHED ABSTRACTS (*: Authors contributed equally)

- RC Seaman, AL Weaver, RL Calabrese (2009) Finding the right balance: Synaptic strength in the leech heartbeat CPG. *Soc. Neurosci. Abstr*. 35: Online (269.2).
- AL Weaver, J Meitzen, EA Brenowitz, DJ Perkel (2007) Breeding conditions alter intrinsic electrophysiological properties of song control neurons in Gambel's white crowned sparrows. *Soc. Neurosci. Abstr*. 33: Online (751.5).
- BJ Norris, AL Weaver, A Wenning, PA Garcia, RL Calabrese (2006) Control of motor neuron activity by a CPG: a case for unpacking. *Soc. Neurosci. Abstr*. 32: Online (350.5).
- AL Weaver, RL Calabrese (2005) A role for compromise: Inhibitory and electrical synapse effects on phasing in the leech heartbeat CPG. *Computational Neuroscience Meeting Abstr*. 14:45.
- D Perkins-Balding*, AL Weaver* (2004) Approach, design, and evaluation of an introductory biology course taught by FIRST fellows at Spelman College. *IRACDA Meeting Abstr*.
- AL Weaver, RL Calabrese (2003) Effects of chemical and electrical synapses on phase relationships in a complete model of the heartbeat CPG in the medicinal leech. *Soc. Neurosci. Abstr*. 29: Online (605.10).
- AL Weaver, KH Hobbs, SL Hooper (2001) Synaptic coupling greatly increases the range of "non-integer" ($n:m$) entrainment. *International Congress of Neuroethology Meeting*. 6:250.
- AL Weaver, SL Hooper (2000) Within the normal pyloric frequency range, removal of LP and VD neuron input has very little effect on pyloric activity. *Soc. Neurosci. Abstr*. 26:454.

- E Buchman, JB Thuma, AL Weaver, SL Hooper (2000) Model conductances that reproduce the PY neuron delay shifts observed in response to changes in stimulus paradigm. Soc. Neurosci. Abstr. 26:2000.
- AL Weaver, SL Hooper (1999) Integer (1:1, 2:1) and non-integer (2:3, 3:4) entrainment of the pyloric pacemaker by rhythmic current injection into the follower LP and VD neurons. Soc. Neurosci. Abstr. 25:1642.
- N Hoover, N Weathington, AL Weaver, SL Hooper (1999) EJP amplitude shows large random variation in several intrinsic pyloric muscle in *Panulirus*. Soc. Neurosci. Abstr. 25:1642.
- AL Weaver, JB Thuma, SL Hooper (1998) What role do the LP and VD neurons play in pyloric network phase maintenance? Soc. Neurosci. Abstr. 24:1891.
- AL Weaver, RA DiCaprio, SL Hooper (1996) Existing stomatogastric neuron models predict some, but not all, responses to rhythmic input. Soc. Neurosci. Abstr. 22:131.

MENTORED UNDERGRADUATE RESEARCH

2011-Present	Danielle Shepard (SMC)	<ul style="list-style-type: none"> Quantitatively measured the outputs of homologous leech neurons in several leech species to carry out specific aim one from the 2011-12 VGN grant.
2010-Present	Kristen Cowens (SMC)	<ul style="list-style-type: none"> Primary: Tested the effects of different physiological parameters on the activity patterns and phasing of a computer model of the nervous system to carry out specific aim two from the 2011-12 VGN grant. This project will form the basis for her <i>senior honors project in Biology</i>. Secondary: Measured the heartbeat system circulatory anatomy in several leech species using MicroCT imaging. Tertiary: Measured the outputs of homologous leech neurons and muscles. Performed video analysis of blood flow in juvenile leeches.
2010-2011	Amanda Willette (SMC)	<ul style="list-style-type: none"> Primary: Measured the outputs of homologous leech neurons and muscles. Performed video analysis of blood flow in juvenile leeches. Secondary: Measured the heartbeat system circulatory anatomy in several leech species using MicroCT imaging.
2007-2009	Bria Miller (Xavier University)	<ul style="list-style-type: none"> Investigated the role of synaptic coupling on phase relationships in a complete model of the heartbeat CPG in the medicinal leech, <i>Hirudo medicinalis</i>.
1999-2002	Kevin Hobbs (Ohio University)	<ul style="list-style-type: none"> Identified the muscles innervated by the PY neurons of the pyloric network. Investigated pyloric pacemaker entrainment using two dimensional neuron models. Research support: Program to Aid Career Exploration award Presentations: 2001 International Congress of Neuroethology (poster)
1998-2000	Neil Hoover (Ohio University)	<ul style="list-style-type: none"> Compared different types of pyloric muscles' excitatory junctional potentials and contractile properties. Research results were published in J. Neurosci., 2002, and his undergraduate honors thesis. Research support: Program to Aid Career Exploration award Received Ohio University Student Enhancement award and Outstanding Undergraduate Research Presentation award (both university-wide competitions). Presentations: 1999 Soc. for Neuroscience (poster), 1999 East Coast Nerve Net (talk)
1998	Nate Weathington (University of South Alabama)	<ul style="list-style-type: none"> Investigated and recorded pyloric muscle excitatory junctional potentials. Research support: NSF Research Experiences for Undergraduates Presentations: 1999 East Coast Nerve Net (talk), 1998 Research Experiences for Undergraduates (talk)
1996	Julie Rappaport (Bowdoin College)	<ul style="list-style-type: none"> Compared passive electrotonic models of different pyloric neuron types. Measured pyloric neuron electrotonic properties to study the efficacy of synapses. Research support: NSF Research Experiences for Undergraduates Presentations: 1996 Research Experiences for Undergraduates (talk)

TEACHING EXPERIENCE

Saint Michael's College	<ul style="list-style-type: none"> • Comparative Vertebrate Anatomy • Advanced Topics: Neurobiology • Introductory Cell Biology and Genetics • Biological Reading & Writing
Xavier University	<ul style="list-style-type: none"> • Human Anatomy & Physiology (College of Pharmacy, College of Arts & Sciences) • Human Anatomy & Physiology Lab (College of Pharmacy) <ul style="list-style-type: none"> - Redesigned course to incorporate both hands-on and computerized labs. • General Biology (College of Arts & Sciences) • General Biology Lab (College of Arts & Sciences)
Spelman College	<ul style="list-style-type: none"> • General Biology II (co-instructor: Spring 2004) <ul style="list-style-type: none"> Redesigned course to incorporate group discussion and research papers. • General Biology II (guest lectures) • Neurobiology (guest lectures) <p>Advisor: Dr. Michael (Gene) McGinnis</p>
Emory University	<ul style="list-style-type: none"> • Postdoctoral Teaching Practicum (training as a student in best teaching practices). <p>Advisor: Dr. Arri Eisen</p>
Ohio University	<ul style="list-style-type: none"> • Human Neuroscience (Human Neuroanatomy Lab) • Introduction to Zoology (Survey of the Animal Kingdom) • Neuroscience Methods (Neurophysiology Experimental Lab) • Population and Community Ecology • Principles of Physiology I • Principles of Physiology II • Statistics • Time, Change, and Dynamic Systems (guest lectures)
UCLA	<ul style="list-style-type: none"> • Cells, Tissues, and Organs • Evolution, Ecology and Biodiversity • Genetics • Teaching Apprentice Practicum (training as a student)
University of Delaware	<ul style="list-style-type: none"> • Genetics and Evolutionary Biology Lab • Undergraduate Tutor in Biology and Psychology

INVITED TALKS

“Loveable Local Leeches!!!” – Amanda Willette, Kristen Cowens, & Adam Weaver

- The Schoolhouse, South Burlington, VT, 2010.

Workshop Presentation: “My Career Path and Research”

- Tri Beta National Biological Honor Society, Dept. of Biology, Saint Michaels College, 2010.

Workshop Presentation: “Blackboard: Unleashing Its Power in the Classroom—Tests & Surveys”

- Center for the Advancement of Teaching, Xavier University of Louisiana, 2009.

“Life-Sustaining Rhythm: Ebb and Flow in the Leech Heartbeat System”

- Biology Dept., Longwood University, 2009.
- Biology Dept., Saint Michaels College, 2009.
- Biology Dept., Augustana College, 2008.
- School of Mathematics & Science, Reinhardt College, 2008.
- Biology Dept., Bridgewater State College, 2007.
- Biology Dept., Calif. State University—East Bay, 2007.
- Biology Dept., Xavier University of Louisiana, 2007.
- Biology Dept., Benedictine University, 2007.

POST-DOCTORAL RESEARCH SUMMARY

University of Washington in the lab of Dr. David Perkel (experimental research)

- Explored activity-dependent synaptic plasticity in a forebrain circuit involved in acquisition of learned vocal motor patterns in the songbird zebra finch (*Taeniopygia guttata*).
- Characterized the physiological properties and intrinsic conductances in a premotor nucleus involved in song production.

Emory University in the lab of Dr. Ronald Calabrese (computer modeling research)

- Created a full network model of the central pattern generator underlying contractions in the medicinal leech (*Hirudo medicinalis*) heart.
- Produced a database exploring the activity patterns of a medicinal leech elemental oscillator network model across ionic conductance parameter space.

GRADUATE RESEARCH SUMMARY

Ohio University in the lab of Dr. Scott Hooper (experimental and computer modeling research)

- Characterized the synaptic mechanisms of pyloric network phase maintenance and cycle frequency control in the spiny lobster (*Panulirus interruptus*).
- Investigated requirements for network entrainment in pyloric network and model pyloric neurons.

Dissertation: "The functional roles of the Lateral Pyloric and Ventricular Dilator neurons in the pyloric network of the lobster, *Panulirus interruptus*."

RESEARCH PRESENTATIONS (*: Authors contributed equally)

AL Weaver, RL Calabrese (2005) A role for compromise: synaptic inhibition and electrical coupling on phase relationships in a complete model of the heartbeat CPG in the medicinal leech. Computational Neuroscience Meeting.

D Perkins-Balding*, AL Weaver* (2004) Approach, design, and evaluation of an introductory biology course taught by FIRST fellows at Spelman College. IRACDA Meeting.

AL Weaver, RL Calabrese (2004) Effects of synaptic inhibition and electrical coupling on phase relationships in a complete model of the medicinal leech heartbeat CPG. South East Nerve Net Meeting.

AL Weaver, RL Calabrese (2003) Effects of chemical and electrical synapses on phasing in a complete model of the heartbeat CPG in the medicinal leech. South East Nerve Net Meeting.

LG Morris, AL Weaver, BJ Norris, RL Calabrese (2003) Phases of premotor and switch heart interneurons in the leech. South East Nerve Net Meeting.

AL Weaver, KH Hobbs, SL Hooper (2001) Synaptic coupling greatly increases the range of "non-integer" ($n:m$) entrainment. International Congress of Neuroethology Meeting.

AL Weaver, SL Hooper (2000) Within the normal pyloric frequency range, removal of LP and VD neuron input has very little effect on pyloric activity. Stomatogastric Satellite Meeting.

AL Weaver, SL Hooper (2000) Within the normal pyloric frequency range, removal of LP and VD neuron input has very little effect on pyloric activity. East Coast Nerve Net Meeting.

AL Weaver, SL Hooper (1999) Integer ($1:1$, $2:1$) and non-integer ($2:3$, $3:4$) entrainment of the pyloric pacemaker by rhythmic current injection into the follower LP and VD neurons. East Coast Nerve Net Meeting.

N Hoover, N Weathington, A Weaver, SL Hooper (1999) EJP amplitude shows large random variation in several intrinsic pyloric muscles in *Panulirus*. East Coast Nerve Net Meeting.

AL Weaver (1994) Distributed problem solving. Southern California Artificial Life Meeting.

AL Weaver, RF Simons (1994) The effect of visual imagery on human startle response. University of Delaware Undergraduate Research Symposium.

ELECTED SERVICE

2000-2002 Democratic Party Central Committee (Senator), Athens County, Ohio
 1998-2000 University Graduate Student Senate (Senator), Ohio University
 1996-1997 University Graduate Student Senate, Ohio University

EXTERNAL REFERENCESResearch

Ronald L. Calabrese, Ph.D.
 Professor of Biology

Emory University
 Department of Biology
 O. Wayne Rollins Research Center
 1510 Clifton Road NE
 Atlanta, GA 30322-4218
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Scott L. Hooper, Ph.D.
 Professor of Biology

Ohio University
 Department of Biological Sciences
 108 Irvine Hall
 Athens, OH, 45701

voice: (740) 593-0679
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David J. Perkel, Ph.D.
 Professor of Biology and Otolaryngology

University of Washington
 Box 356515
 1959 NE Pacific St. HSB BB1165
 Seattle, Washington 98195-6515

voice: (206) 221-2477
email: perkel@u.washington.edu

Teaching

Robert C. Blake II, Ph.D.
 Professor of Pharmacy

Div. of Basic Pharmaceutical Sciences
 Xavier University of Louisiana
 College of Pharmacy Ste. 425
 1 Drexel Drive
 New Orleans, LA 70125-1098
voice: (504) 520-7489
email: rblake@xula.edu

Arri Eisen, Ph.D.
 Senior Lecturer

Emory University
 Department of Biology
 O. Wayne Rollins Research Ctr.
 1510 Clifton Road NE
 Atlanta, GA 30322-4218
voice: (404) 727-4354
email: arri.eisen@emory.edu

Michael (Gene) McGinnis, Ph.D.
 Associate Professor of Biology

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 350 Spelman Ln SW
 Box #213
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