Steven B. Symington, PhD

Salve Regina University
Dept. of Biology and Biomedical Science
O'Hare Academic Center
100 Ochre Point Ave Citizenship:
Newport, RI 02840-4192

Work Ph: 401.341.3249
Fax: 401.341.2993
Email: steven.symington@salve.edu
United States of America

I. EDUCATION

2016	Sabbatical, University of Massachusetts Amherst, MA. Dr. Yeonhwa Park and Dr. John Clark. Sabbatical Research
2005	Doctor of Philosophy, Molecular and Cellular Biology, University of Massachusetts at Amherst (Concentration in Biochemical & Molecular Toxicology).
2000	Masters of Science, Entomology, University of Massachusetts at Amherst (Concentration in Pesticide Toxicology).
1995	Bachelors of Science, Environmental Science, University of Massachusetts at Amherst (Concentration in Environmental Toxicology and Chemistry).

II. POSITIONS HELD

2021 – 2022	Director of Undergraduate Research and Creative Inquiry, Salve Regina University, Newport RI.
2020 – Pres	Professor of Biology and Biomedical Science (with tenure), Salve Regina University, Newport, RI.
2019 – 2022	Department Chairperson, Department of Biology and Biomedical Science, Salve Regina University
2015 – 2016	Interim Department Chairperson, Department of Biology and Biomedical Science, Salve Regina University
2011 – 2020	Associate Professor of Biology and Biomedical Science (with tenure), Salve Regina University, Newport, RI.
2011 – Pres	Adjunct Professor of Veterinary and Animal Science, University of Massachusetts, Amherst, MA.
2005 – 2011	Assistant Professor of Biology and Biomedical Science, Salve Regina University, Newport, RI.
2000 – 2004	Research Assistantship, Molecular and Cellular Biology Program, University of Massachusetts at Amherst. Dissertation Research: Molecular action of T- and CS-syndrome pyrethroids on voltage-sensitive calcium channels in the rat central nervous system.
1995 – 2004	Toxicology Laboratory Manager, University of Massachusetts at Amherst.
1995 – 2000	Research Assistantship, Department of Entomology, University of Massachusetts at Amherst. Masters Research: Characterization of the action of pyrethroids on the ciliary calcium channel of *Paramecium tetraurelia*
1994 – 1995	Toxicology Research Technician, University of Massachusetts at Amherst.
1995	Research Intern, Environmental Science Program, University of Massachusetts at Amherst. Recombinant DNA technologies and protein detection methods.
1994	Research Intern, Environmental Science Program, University of Massachusetts Amherst. Analysis of abamectin metabolism in resistant *Leptinotarsa decemlineata*.

1994	Research Intern, Environmental Science Program, University of Massachusetts at Amherst. Analysis of volatile and dislodgable pesticide residues on turfgrass.
1993	Chemical Analyst, Massachusetts Pesticide Analysis Laboratory, University of Massachusetts at Amherst.

III. SERVICE & PROFESSIONAL DEVELOPMENT

SERVICE TO SALVE REGINA UNIVERSITY

2023 – 2024	Biology Search Committee, (Molecular Biologist)
2022	NSF S-STEM grant Committee Chair
2021 – 2023	University Grievance Committee
2020 – 2021	Biology Search Committee, (Visiting Assistant Professor)
2020 – 2022	Salve Signature Experience Committee Member
2020 – 2023	Core Curriculum Structuring Committee Member
2019 – 2021	Sabbatical Committee Member
2019 – 2020	Strategic Compass Committee Member
2018 – 2019	Biology Search Committee, (Cell Biology)
2016 – 2017	Education Search Committee, (Elementary Education)
2015 – 2016	Education Search Committee, (Special Education)
2014 – 2015	Biology Search Committee, (Behavioral Physiologist)
2014 – 2015	Biology Search Committee, (Microbiologist)
2013 – 2014	Core Implementation Committee
2011 – 2014	Curriculum Committee, Chair
2011 – 2013	Library Advisory Committee, Chair
2011 – 2012	Academic Vision Committee Member
2011 – 2012	Academic Technology Committee Member
2010 – 2011	Biology Search Committee, (Developmental Biology)
2010 – 2013	Faculty Assembly Executive Committee Member
2009 – 2011	Faculty Salary and Benefits (FACSB) Committee Member
2009 – 2010	Salve Regina University Academic Rigor Committee Member
2009 – 2010	Salve Regina University First Year Experience Steering Committee Member
2008 – 2009	Salve Regina University Diversity Committee Member
2008 – 2009	New Student Seminar Evaluation Committee Member
2007 – 2010	Salve Regina University Collegiums' Participant Member
2007 – 2009	Student Association of Interdisciplinary Life Science (SAILS) Club Faculty Advisor
2007 – 2007	University Library Committee Member
2006 – 2007	Information Literacy and Technology Across the Curriculum (ILTAC) Committee Member
2005 – Pres	Connections Day Participant
2005 – Pres	Fall Open House Participant

SERVICE PRESENTATIONS

Dr. Symington has been a regular participant at Salve University recruiting events for the last 20 years. He is a regular presenter at open house, connections day, orientation, and science spotlight events. He has also made several presentations to a variety of the university donors

UNDERGRADUATE ADVISING

2020 – 2022	Undergraduate Research Club Faculty Mentor
2020 – 2022	SRyou Faculty Mentor
2019 – 2020	Biology First Year Advisor
2016 – Pres	Salve Baseball Faculty Mentor
2016 – 2019	University Health Profession Advisor
2010 – 2019	Department of Biology and Biomedical Science Departmental Liaison

Dr. Symington advises approximately 35 – 50 students each year. He continues to serve as Departmental Liaison for the Biology and Chemistry Department. He also serves as an advisor for Biology majors and for students taking independent studies in his laboratory in the Biology and Biomedical Sciences Department.

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

1. American Chemical Society (ACS), *Agrochemical Division, Chemical Toxicology*
2. Society for Neuroscience (SfN)
3. Society of Toxicology (SOT)
4. Council for Undergraduate Research (CUR)

SERVICE TO DISCIPLINE

2021 – 2024	Peer reviewer for the journal "Food and Chemical Toxicology"
2016 – 2022	Steering Committee Member, Rhode Island Idea Network for Biomedical Research Excellence (RI-INBRE)
2015	Invited expert witness for the Council for the Advancement of Pyrethroid Human Risk Assessment in the proceedings of the EPA Science Advisory Panel (SAP) regarding EPA's proposed Research to Evaluate the Potential Juvenile Sensitivity to Pyrethroids. Arlington, VA. 5/19-21/2015.
2013 – 2024	Peer reviewer for the journal "Neurotoxicology"
2012	Organizer Northeast Society of Toxicology Annual Meeting. "Translational Biomarkers in Toxicology" Salve Regina University Newport, Rhode Island. 10/19/2012
2011 – Pres	Peer reviewer for the journal "Pest Management Science"
2011 – Pres	Peer reviewer for the journal "Pesticide Biochemistry and Physiology"
2010 – 2022	Peer reviewer for the journal "Toxicological Sciences"
2010 – 2011	Society of Toxicology - education committee member.
2009 – 2014	Peer reviewer for the journal "Journal of Cutaneous Medicine and Surgery"
2009 – 2012	Faculty advisor for Salve Regina University peer review team for the undergraduate research journal, *Impulse*. "*Impulse* is the first international, online neuroscience journal for undergraduate publications."
2009	4th annual BioNES undergraduate poster judge.
2009	Invited expert witness for the Pyrethroid Working Group (PWG) in the proceedings of the EPA Science Advisory Panel (SAP) regarding EPA's proposed Common Mechanism Grouping of the Pyrethroids. Arlington, VA. 6/15-18/2009.

PROFESSIONAL DEVELOPMENT

2020 Development and Teaching an Online Course, Magna Publications, 8/31/2020.
2011 HPLC Workshop at the RI-INBRE Centralized Research Core Facility University of Rhode Island
2009 LiCOR Biotechnology Training Program. Lincoln, NE. 12/17-19/2009.
2006 Grant Institute-Grants 101: Professional Grant Proposal Writing, Boston, MA.
2005 RI-INBRE-SELDI-TOF ProteinChip Technology Workshop, Kingston, RI.
2005 Laboratory Safety Institute-Two Day Lab Safety Short Course, Boston, MA.

IV. SCHOLARSHIP

RESEARCH AWARDS RECEIVED

2013 Sister M. Therese Antone Faculty Recognition Award Winner.
2005 American Chemical Society, Agrochemicals Division, Young Scientist Research Recognition Award Finalist, 229th ACS National Meeting, San Diego, CA March 13-17, 2005.
2003 Molecular and Cellular Biology Program, University of Massachusetts, Graduate Student Research Award
2003 American Chemical Society, Agrochemicals Division, Graduate Student Research Award Winner.
2003 American Chemical Society, Agrochemicals Division, Graduate Student Travel Award.
2002 American Chemical Society, Agrochemicals Division, Graduate Student Travel Award.
2002 Graduate School Travel Scholarship, University of Massachusetts at Amherst.
1999 Society of Environmental Toxicology and Chemistry, Graduate Student Travel Award.
1998 American Chemical Society, Agrochemicals Division, Graduate Student Research Award winner.
1998 American Chemical Society, Agrochemicals Division, Graduate Student Travel Award.
1998 Graduate School Travel Scholarship, University of Massachusetts at Amherst.

RESEARCH PRESENTATIONS

1. "Targeted Evaluation of Aged Related Pharmacodynamics Using Mammalian Microtransplanted Neurolemma Preparations" University of Rhode Island, Kingston, RI. 3/28/2016.

2. "Pyrethroids and Regulatory Toxicology" Salve Regina University, Circle of Scholars Newport, RI. 6/24/2015.

3. "Targeted Evaluation of Aged Related Pharmacodynamics Using Mammalian CNS neurolemma Preparations" Environmental Protection Agency Science Advisory Panel (SAP) regarding EPA's proposed Research to Evaluate the Potential Juvenile Sensitivity to Pyrethroids. Arlington, VA. 5/20/2015.

4. "Effects of Pyrethroids on Human Sodium Channels Co-expressed with the β1 and β2 subunits" Environmental Protection Agency Science Advisory Panel (SAP) regarding EPA's proposed Research to Evaluate the Potential Juvenile Sensitivity to Pyrethroids. Arlington, VA. 5/20/2015.

5. "Microtransplantation of Rat Brain Neurolemma in *Xenopus* Oocytes." United States Environmental Protection Agency, Research Triangle Park, NC. 1/27/2014.

6. "Mechanism of action of pyrethroid insecticides." United States Environmental Protection

Agency, Washington. DC. 11/17/2013.

7. "Validation of depolarization-evoked, TTX-sensitive sodium currents associated with rat brain neurolemma microtransplanted into *Xenopus* laevis oocytes and their modification by pyrethroids." United States Environmental Protection Agency, Washington. DC. 11/17/2013.

8. "Neurolemma-injected oocytes as a tool to investigate age-dependent toxicity of pyrethroids effects in rats." Consumer Safety Product Association, Washington. DC. 11/16/2013.

9. "Evaluation of an *in vitro* assay to characterize the effects of environmental contaminants on native ion channels in the spirit of good laboratory practices: Role of University Labs." American Chemical Society 246th National Meeting. Indianapolis, IN 9/9/2013.

10. "Neurolemma-injected oocytes as a tool to investigate age-dependent toxicity of pyrethroids effects in rats." United States Environmental Protection Agency, Washington. DC. 2/7/2013.

11. "Bioassays in pharmacology and toxicology." Providence College, Providence, RI. 4/10/2012

12. "Microtransplantation of rat brain neurolemma in *Xenopus* oocytes." Brown University, Providence, RI. 4/6/2012

13. "Human low voltage-activated calcium channel isoforms are inhibited by pyrethroids" 4th Annual Northeast Regional IDeA Meeting. Salve Regina University, Newport, RI 8/10-12/2011.

14. "Action of the CS-syndrome pyrethroid, deltamethrin, on the current characteristics of a mammalian N-type calcium channel" 3nd Annual Northeast Regional IDeA Meeting. Dartmouth Medical School, Whitefield, NH. 8/5-7/2009.

15. "Pyrethroid modulation of mammalian voltage-sensitive calcium channels" Rhode Island Research Alliance-Emerging Biomedical and Life Sciences Research in RI. Providence, RI. 6/3/2008.

16. "Pesticides and issues relating to human health" Salve Regina University, Newport, RI. 3/9/2006.

17. "Characterization of pyrethroids on sperm voltage-sensitive calcium channels" Providence College, Providence, RI. 1/27/2006. "Insecticides as Tools in Probing Vital Receptors and Enzymes in the Nervous and Reproductive Systems" Salve Regina University, Newport, RI. 10/24/2005.

18. "Toxicological research opportunities at SRU" Salve Regina University, Newport, RI. 3/9/2005.

19. "Comparative toxicity of commercially available pyrethroids at rat brain presynaptic nerve terminals" American Chemical Society 229th National Meeting. San Diego, CA 3/13/2005.

20. "Comparative action of cismethrin and deltamethrin on voltage-sensitive calcium channels associated with mammalian presynaptic nerve terminals" American Chemical Society 228th National Meeting. Philadelphia, PA. 8/23/2004.

21. "The Neurotoxicology of Pyrethroid Insecticides: A Story of Regulatory Toxicology" Rhode Island College, Providence, RI, 5/5/2004.

22. "High-Throughput Assay Development for the Determination of Insecticide Activity using Synaptosomes" FMC Corp. Princeton, NJ. 10/12/2001.

23. "Characterization of the Action of Type II Pyrethroids on the Voltage-Sensitive Calcium Channel of *Paramecium*." Department of Entomology, University of Massachusetts, Amherst, MA. 5/1/2000.

BOOK CHAPTERS PUBLISHED

1. J.M. Clark and **S.B. Symington**. "Neurolemma-injected *Xenopus* oocytes: an innovative *ex vivo* approach to study the effects of pyrethroids on ion channels in their native state." Engineering. Volume 6, Issue 5, 515-521, 2020. [doi.org/10.1016/j.eng.2019.10.017].

2. **S.B. Symington**, E. Murenzi, A.C. Toltin, D. Lansky and J. M. Clark. Realizing the Potential: Improving a Microtransplantation Assay Based on Neurolemma-injected *Xenopus* Oocytes; an *ex vivo* approach to study ion channels in their native state. In "Advances in Agrochemicals: G Protein-Coupled Receptors (GPCRs) and Ion Channels as Targets for Pest Control". Ed; A. Gross, Y. Ozoe, J Coats. Volume 1 Ion Channels and Gap Junctions, 53-73. 2017.

3. E. Murenzi, M.C. Snyder, A.C. Toltin, **S.B. Symington**, and J.M. Clark. Permethrin mimics the action of DDT on adult rat brain neurolemma microtransplanted into *Xenopus laevis* oocytes**.** Proc. II Int. Symp. on Pyrethrum Eds.: K. Matsuda, M. Morimoto and M. Ihara. *Acta Hortic.* ISHS 1169. 2017 DOI 10.17660/ActaHortic.2017.1169.4

4. Clark, J.M., and **S.B. Symington**. Advances in the mode of action of pyrethroids. *In "*Pyrethroids: From Chrysanthemum to Modern Industrial Insecticide*"* ed by N. Matsuo and T. Mori. *Topics in Current Chemistry*, Volume 314, 49-72, 2012. [DOI: 10.1007/128_2011_268].

PEER REVIEWED ARTICLES PUBLISHED

1. **Symington, S.B.,** A.C. Toltin, E. Murenzi, D. Lansky and J. Marshall Clark. Determination of Determination of potential toxicodynamic differences of pyrethroid insecticides on native voltage-sensitive sodium channels in juvenile versus adult rat brain. *Pestic Biochem Physiol*,189. 1-11; 2023, 105296. (doi.org/10.1016/j.pestbp.2022.105296)

2. A. Suvorov, **S.B. Symington**, J.M. Clark, and Y. Park. Membrane polarization in non-neuronal cells as potential mechanism of metabolic disruption by depolarizing insecticides. *Food and Chemical Toxicology*. 160 (2022) [doi.org/10.1016/j.fct.2021.112804]

3. J.S. Yang, **S.B Symington**, J.M Clark, and Y. Park. Permethrin, a pyrethroid insecticide, regulates ERK1/2 activation through membrane depolarization-mediated pathway in HepG2 hepatocytes. *Food and Chemical Toxicology*. 121; 387–395. (2018) [doi.org/10.1016/j.fct.2018.09.009].

4. E. Murenzi, A.C. Toltin, **S.B. Symington**, M.M. Morgan, and J.M. Clark. Evaluation of Microtransplantation of Rat Brain Neurolemma into *Xenopus laevis* Oocytes as a Technique to

Study the Effect of Neurotoxicants on Endogenous Voltage-sensitive Ion Channels. *Neurotoxicology*, 60: 260–273. 2017

5. Savino, S. and **S.B. Symington**. Development and Evaluation of a Mouse Neocortical Cells Neurodevelopment Assay to Assess the Effects of Pyrethroids. Pell Scholars and Senior Theses. Department of Biology and Biomedical Science, Salve Regina University, Newport, RI. eScholar@Salve Regina, June 2012.

6. **Symington**, **S.B.,** H. Hodgdon, R.K. Frisbie, and J.M. Clark. Binary mixtures of pyrethroids produce differential effects on Ca^{2+} influx and glutamate release at isolated presynaptic nerve terminals from rat brain*. Pestic Biochem Physiol* 99: 131-139, 2011.

7. Alves, A., **S.B. Symingto**n, Si Hyeock Lee, and J.M. Clark. PKC-dependent phosphorylations modify the action of deltamethrin on rat brain N-Type ($Ca_v2.2$) voltage-sensitive calcium channel. *Pestic Biochem Physiol* 97: 101-108, 2010. [doi:10.1016/j.pestbp.2009.06.007]

8. Borges, A., D. Salter, S. Kadar, and **S.B. Symington**. The development of a comprehensive mechanism for intracellular calcium oscillations: a theoretical approach and an experimental validation. Pell Scholars and Senior Theses. Department of Chemistry, Salve Regina University, Newport, RI. eScholar@Salve Regina, June 2010. [http://escholar.salve.edu/pell_theses/52]

9. Breckenridge, C., L. Holden, M. Nemec, M. Weiner, L. Sheets, D. Sargent, J-S. Choi, D.M. Soderlund, **S.B. Symington**, J.M. Clark, S. Burr, and D. Ray. Evidence for separate mechanisms of action of type I and type II pyrethroid insecticides. *Neurotoxicity* 30: S17-S31 2009. [doi:10.1016/j.neuro.2009.09.002]

10. Catlin, N. and **S.B. Symington**. Deltamethrin Inhibits the Human T-type Voltage-Sensitive Calcium Channel ($Ca_v3.2$). *Impulse* March, 2009.

11. **Symington, S.B**., R.K. Frisbie, and J.M. Clark. Characterization of eleven commercial pyrethroids on functional attributes of rat brain synaptosomes. *Pestic Biochem Physiol* 92: 61-69, 2008.

12. Clark, J.M. and **S.B. Symington**. Neurotoxic Implications of the Agonistic Action of CS-syndrome Pyrethroids on $Ca_v2.2$. *Pest Manage Science* 64(6): 628-638, 2008.

13. Yoon, K.S., **S.B. Symington**, S.H. Lee, D.M. Soderlund, and J.M. Clark. Three mutations identified in the voltage-sensitive sodium channel α-subunit gene of permethrin-resistant human head lice abolish permethrin sensitivity of house fly Vssc1 expressed in *Xenopus* oocyte. *Insect Biochem & Mol. Bio.* 38: 296-306, 2008.

14. **Symington, S.B**., R.K. Frisbie, H.J. Kim, and J.M. Clark. Mutation of threonine 422 to glutamatic acid mimics the phosphorylation state and alters the action of deltamethrin on $Ca_v2.2$. *Pestic Biochem Physiol* 88: 312-320, 2007.

15. Clark, J.M. and **S.B. Symington**. Pyrethroid action at calcium channels: neurotoxicological implications. *Invert Neurosci* 7: 3-16, 2007.

16. **Symington, S.B**., R.K. Frisbie, K.D. Lu and J.M. Clark. Action of cismethrin and deltamethrin on functional attributes of isolated presynaptic nerve terminals from rat brain. *Pestic Biochem Physiol* 87: 172-181, 2007.

17. **Symington, S.B.** Comparative toxicity of pyrethroids on voltage-sensitive calcium channels at rat brain presynaptic nerve terminals. Ph.D. Dissertation. Molecular and Cellular Biology Program, University of Massachusetts, Amherst, MA. 2005.

18. **Symington, S.B.,** and J.M. Clark. Action of deltamethrin on voltage-sensitive calcium channels in rat brain. *Pestic Biochem Physiol* 82: 1-15, 2005.

19. Kim, H.J., **Symington, S.B.,** Lee, S.H., and J.M. Clark. Serial invasive signal amplification reaction for the genotyping of permethirn-resistant (kdr-type) Texas head lice, *Pediculus capitis*. *Pestic Biochem Physiol* 80: 173-182, 2004.

20. de Ondarza, J., **Symington, S.B**., Van Houten, J., and J.M. Clark. G-Protein modulators alter the swimming behavior and calcium influx of *Paramecium tetraurelia*. *J Eukaryot Microbiol* 50(5), 349-355, 2003.

21. **Symington, S.B.,** Characterization of pyrethroid action on ciliary calcium channels in *Paramecium tetraurelia.* M.S. Thesis. Department of Entomology, University of Massachusetts, Amherst.

22. **Symington, S.B**., Zhang, A., Karston, W., Van Houten, J., and J.M. Clark. Characterization of pyrethroid action on ciliary calcium channels in *Paramecium tetraurelia. Pestic Biochem Physiol* 65: 181-93, 1999.

23. **Symington, S.B.,** Zhang, A., and J.M. Clark. The Action of pyrethroids on the voltage-sensitive calcium channel of *Paramecium tetraurelia*. *Pestic Sci* 55: 1035-37, 1999.

24. Desena, M.L., Clark, J.M., Edman, J.D., **Symington, S.B**., Scott, T.W., Clark, G.G., and T.M. Peters. Potential aging of female *Aedes aegypti* (Diptera: Culicidae) by gas chromatographic analysis of cuticular hydrocarbons, including field evaluation. *J Med Ent* 36(6): 811-23, 1999.

25. Desena, M.L., Edman, J.D, Clark, J.M., **Symington, S.B**., and T.W. Scott. *Aedes aegypti* (Diptera: Culicidae) age determination by cuticular hydrocarbons analysis of female legs. *J Med Ent* 36(6): 824-30, 1999.

RESEARCH GRANTS AWARDED

1. Project Title: "Comparative assessment of pyrethroids on native voltage-sensitive sodium channels expressed in adult and juvenile rat brain using P2-injected *Xenopus* laevis oocytes." Sponsor: Council for the Advancement of Pyrethroid Risk Assessment (CAPHRA). Co-Authored with J. Marshall Clark, Ph.D., Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003
   9/1/2011-8/31/2019 Total Costs: $1,804,314.00

2. Project Title: "Microinjection of rat brain synaptolemma in *Xenopus* oocytes."
   INBRE/NCRR/NIH Grant # 8P20GM103430-12
   5/1/2013 – 4/30/2014 Total Costs: $55,264.00

3. Project Title: “Microinjection of rat brain synaptolemma in *Xenopus* oocytes.”
   INBRE/NCRR/NIH Grant # 8P20GM103430-12
   5/1/2012 – 4/30/2013 Total Costs: $65,882.00

4. Project Title: “Characterization of pyrethroids on human voltage-sensitive calcium channels.”
   INBRE/NCRR/NIH Grant # P20RR016457
   5/1/2011 - 4/30/2012 Total Costs: $50,858.00

5. Project Title: “Characterization of pyrethroids on human voltage-sensitive calcium channels.”
   INBRE/NCRR/NIH Grant # P20RR016457
   5/1/2010 - 4/30/2011 Total Costs: $51,292.00

6. Project Title: “Characterization of pyrethroids on human voltage-sensitive calcium channels.”
   INBRE/NCRR/NIH Grant # P20RR016457
   5/1/2009 - 4/30/2010 Total Costs: $71,041

7. Project Title: “Characterization of pyrethroids on human voltage-sensitive calcium channels.”
   INBRE/NCRR/NIH Grant # P20RR016457
   5/1/2008-4/30/2009 Total Costs: $98,419.00

8. Project Title: “Development of a genomics based course using LiCOR instrumentation.”
   LiCOR Genomics Education Matching Funds Program
   10/15/2007 Total Costs: $104,304.00

9. Project Title: “Characterization of pyrethroids on sperm voltage-sensitive calcium channels.”
   INBRE/NCRR/NIH Grant # P20RR016457
   8/16/2005-4/30/2008 Total Costs: $421,271.00

10. Equipment Grant INBRE/NCRR/NIH Grant # P20RR016457
    7/1/2005-4/30/2006 Total Costs: $43,400.00.
    Co-Authored with Alison Shakarian, Ph.D., Department of Biology and Biomedical Sciences, Salve Regina University

RESEARCH GRANTS SUBMITTED

1. Project Title: “Role of insecticides in endoplasmic reticulum stress, obesity and type 2 diabetes” Sponsor: NIH (R01). Co-Authored with Yeonhwa Park, Ph.D, Department of Food Science and J. Marshall Clark, Ph.D., Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003

2. Project Title: “Synaptolemma-injected oocytes allow a functional "omics" evaluation of teratogens.” Sponsor: NIH (R21). Co-Authored with J. Marshall Clark, Ph.D., Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003

3. Project Title: “Validation of an *in silico* mathematical model to predict the physiological consequences of environmental toxicant-induced changes in intracellular calcium dynamics.” Sponsor: National Institute of Health – R15 (AREA Award). Co-Authored with Sandor Kadar, Ph.D., Department of Chemistry, Salve Regina University

4. Project Title: "*Xenopus* oocytes, injected with rat brain neurolemma expressing native ion channels, as a direct, comparative and physiologically-relevant assay to characterize the neurotoxic action of pyrethroids." Sponsor: The Pyrethroid Working Group. Co-Authored with J. Marshall Clark, Ph.D., Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003

5. Project Title**: "**Elucidation of the Role of the Raf Kinase Inhibitor Protein (RKIP) in Sperm Capacitation" Sponsor: National Institute of Health – NCRR. Pilot Project for a Center of Biomedical Research Excellence (COBRE). Grant Co-PI's: Dr. Surendra Sharma and Dr. Kim Boekelheide, Brown University

6. Project Title**: "**Raf Kinase Inhibitor Protein (RKIP): A Master Regulator of Sperm Function and Maturation" Sponsor: National Institute of Health - R15 (Area Award). Co-Authored Dr. Kim Boekelheide, Dept. of Pathology and Laboratory Medicine Brown University

7. Project Title: "An undergraduate interdisciplinary program to mathematically describe biological phenomena" Sponsor: National Science Foundation. Co-Authored with Dr. William Stout, Dr. Jameson Chace, and Dr. Sandor Kadar.

8. Project Title**: "**Raf Kinase Inhibitor Protein (RKIP): A Master Regulator of Sperm Function and Maturation" Sponsor: National Institute of Health. Co-Authored with Dr. Jeffery Moffit and Dr. Kim Boekelheide, Dept. of Pathology and Laboratory Medicine Brown University

9. Project Title**: "**The Effect of Deltamethrin on the Voltage-Sensitive Calcium Channels." Sponsor: Support for Mentors and their Students in the Neurosciences (SOMAS). Co-Authored with Natasha Catlin (Salve Regina Undergraduate Student)

10. Project Title**: "**Utility of *Xenopus* oocytes, injected with rat brain neurolemma expressing native ion channels, as a direct, comparative and physiologically-relevant assay to characterize the neurotoxic action of pyrethroids." Sponsor: National Institute of Health (R21). Co-Authored with Dr. J. Marshall Clark, Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003.

CONFERENCE PUBLISHED ABSTRACTS

International Conferences

1. Symington, S.B, A.C. Toltin, E. Murenzi, M.M. Morgan, J.M. Clark. "Permethrin increases tetrodotoxin-sensitive sodium currents associated with rat brain tissue microtransplanted into *Xenopus laevis* oocytes." 13th IUPAC International Congress of Pesticide Chemistry. San Francisco, CA. 8/10-8/14/2014.

2. Toltin, A.C., J.M. Clark, S.B. Symington. "Validation of voltage-sensitive sodium channel isoform expression in adult and juvenile rat brain tissue microtransplanted into Xenopus oocytes." 13th IUPAC International Congress of Pesticide Chemistry. San Francisco, CA. 8/10-8/14/2014.

3. Francis C., K. Cronise, S. Khaliq, R. Kohn, K. McClellan, E. Mutanguha, A. Nazir, C. Rogers, S.M. Sweitzer, S.B. Symington, P. Weed, R. Young, and L.S. Jones. "Using IMPULSE

undergraduate neuroscience education: from experiment to publishing in the classroom." 7th Forum of European Neurosciences, Amsterdam, Netherlands. 7/3-7/2010.

4. Hodgdon, H.E., Frisbie, R.K., Symington, S.B, and J.M. Clark. "Binary mixtures of pyrethroids augment L-glutamate release by interacting with voltage-gated calcium and chloride channels in isolated presynaptic nerve terminals from rat brain." 4th Pan Pacific Conference on Pesticide Science, Honolulu, HI. 6/1-5/2008

5. Yoon, K.S., H.E. Hodgdon, R.K. Frisbie, S.H. Lee, S.B. Symington and J.M. Clark. "Function and molecular detection of the resistant haplotype in permethrin-resistant human head lice using electrophysiology and SISAR." 11th International Congress of Pesticide Chemistry, Kobe, Japan. 8/6-11/2006.

6. Symington, S.B., R.K. Frisbie, H.J. Kim and J.M. Clark. "Phosphorylation of threonine 422 alters the action of deltamethrin on $Ca_v2.2$." 11th International Congress of Pesticide Chemistry, Kobe, Japan. 8/6-11/2006.

7. Clark, J.M., Lee, S.H., Kim, H.J., Yoon, K.S., Gao J.R., Symington S.B., and D.J. Hawthorne. "Molecular Detection of Knockdown Resistant Mutations in Insects." 10th Int Congress of Pestic. Chem. Basel Switzerland, 8/4-9/2002. Abst. No. 3C.41.

8. Symington, S.B., and J.M. Clark. "Differential Effects of T- and CS-Syndrome Pyrethroids on the Voltage-Sensitive Calcium Channels in the Rat Central Nervous System." 10th Int Congress of Pestic. Chem., Basel Switzerland, 8/4-9/2002. Abst. No. 3C.16.

9. Symington, S.B., Zhang, A., and J.M. Clark. "Pyrethroids Act as Calcium Channel Agonist in *Paramecium.*" Neurotox'98. Oxford Univ. Oxford, UK, 7/28-31/1998. Abst. No. 3.

10. Symington, S.B., and J.M. Clark. "Pyrethroids Act as Calcium Channel Agonist in *Paramecium.*" 9th Int. Congress of Pestic. Chem., London, UK, 8/2-7/1998. Abst. No. 4B-0042.

National Conferences

1. Murenzi, E.1, Toltin, A., Symington, S.B., Clark, J.M. Determination of toxicodynamic differences of sodium channel isoforms to pyrethroids in juvenile and adult rat brain tissue microtransplanted into *Xenopus* oocytes. 256th ACS National Meeting & Exposition. Boston, MA. 8/19-23/2018. AGRO Abstract No. 306.

2. Murenzi E., A.C. Toltin, S.B. Symington, J.M. Clark. "Pyrethroids increase tetrodotoxin-sensitive sodium currents expressed in rat brain tissue microtransplanted into *Xenopus laevis* oocytes." Society of Toxicology. Baltimore, MD 3/12-3/16/2017.

3. Murenzi E., S.B. Symington, A.C. Toltin, M.M. Morgan, J.M. Clark. "Microtransplantation of Rat Brain Neurolemma into Xenopus laevis Oocytes to Study of the Effect of Environmental Toxicants on Endogenous Voltage-Sensitive Ion Channels." American Chemical Society AGRO Division. Boston, Ma. 8/16-8/20/2015.

4. Symington, S.B., Toltin, A.C., Murenzi, E., Morgan, M.M. Clark, J.M.. Permethrin increases tetrodotoxin-sensitive sodium currents associated with rat brain tissue microtransplanted into Xenopus laevis oocytes. "Picogram Program and Abstract Book: 13th IUPAC International

Congress of Pesticide Chem. and 148th Amer. Chem. Soc. Nat. Meeting, San Francisco, CA", vol 86, number 681, ACS/AGRO Division, 2014, 112.

5. Clark, J.M., Murenzi, E., Morgan, M. M., Symington, S.B.. Functional expression of native ion channels expressed in rat brain tissue microtransplanted into Xenopus laevis oocytes and characterization of TTX-sensitive current. "Picogram Program and Abstract Book: 13th IUPAC International Congress of Pesticide Chemistry and 248th American Chem. Soc. National Meeting, San Francisco. CA", Vol 86, number 679, ACS/AGRO Division, 2014.

6. Symington, S.B., Murenzi, E., Osimitz, T., Sheets, L., Minnema, D., Brooks, M., Gammon, D., and J.M Clark. “Rat brain neurolemma microtranplanted into *Xenopus* oocytes is a useful tool to examine the effects of environmental toxicants on endogenous voltage-sensitive ion channels.” 53rd Annual Society of Toxicology. Phoenix, AZ. 3/22-27/2014

7. Symington, S.B., Murenzi, E., Yoon, K.S., Clark, J.M. Evaluation of an in vitro assay to characterize the effects of environmental contaminants on native ion channels in the spirit of good laboratory practices: Role of university labs. “Picogram: Abstract Book”, vol. 84, 2013, ACS/AGRO, 173 pages, page 177, number 114.

8. Symington, S.B., Murenzi, E., and J. M. Clark. “Microtransplantation of rat brain neurolemma into *Xenopus* oocytes, as a direct, comparative and physiologically-relevant assay to characterize the neurotoxic actions of pyrethroids on native ion channels.” 42nd Society of Neuroscience, New Orleans, LA 10/13-17/2012.

9. Gay, J.C., Bainter, W., Irving, C., and S.B. Symington. Stereospecific inhibition of the human T-type voltage-sensitive calcium channel isoforms by pyrethroids.” 4th Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE), Washington DC. 6/25-27/2012

10. Mutanguha, E. and S.B. Symington. “Effect of pyrethroid mixtures alone and in combination on the human T-type voltage-sensitive calcium channel ($Ca_v3.2$).” 40th Society of Neuroscience, San Diego, CA. 11/15-19/2010.

11. Symington, S.B. and E. Mutanguha. “Structural specific inhibition of a mammalian T-type voltage-sensitive calcium channel ($Ca_v3.2$) by pyrethroids.” 3rd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE). Washington, DC. 6/16-18/2010.

12. Mutanguha, E.M., Valentine, Z.H. and S.B. Symington. “Inhibition of a Human T-type voltage-sensitive calcium channel is structural specific and concentration-dependent.” 49th Annual Society of Toxicology. Salt Lake City, UT. 3/7-11/2010.

13. Catlin, N.R., Mutanguha, E. and S.B. Symington. “Structure activity relationship of pyrethroids on the human T-type voltage-sensitive calcium channel.” 48th Annual Society of Toxicology. Baltimore, MD. 3/19/2009. Abstract #2129.

14. Symington, S.B., and N. Catlin. “Pyrethroid modulation of human $Ca_v3.2$.” 38th Society of Neuroscience, Washington DC. 11/15-19/2008.

15. Alves, A., Symington, S.B, and J.M. Clark. “Deltamethrin increases peak current and slows deactivation kinetics of the voltage-sensitive calcium channel ($Ca_V2.2$) from rat brain following

PKC-dependent phosphorylation." 236th American Chemical Society meeting, Division of Agrochemicals, Philadelphia, PA. 8/17-21/2008. Program No. 61.

16. Catlin, N., Mutanguha, E. and S.B. Symington. "Pyrethroid inhibition of the mammalian T-type voltage-sensitive calcium channel ($Ca_v3.2$)." 2nd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE). Washington, DC. 8/6-8/2008.

17. DuLac, M., Salter, D., Bonheur, N., Hestand, K., and S.B. Symington. "Pyrethroid effects on mouse spermatozoa motility and capacitation." 2nd Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE). Washington, DC. 8/6-8/2008.

18. Symington, S.B., Frisbie, R.K., and J.M. Clark. "Characterization of eleven commercial pyrethroids on functional attributes of rat brain synaptosomes." 37th Society of Neuroscience, San Diego, CA. 11/3-7/2007.

19. Symington, S.B., R.K. Frisbie, H.J. Kim and J.M. Clark. "Effect of $Ca_v2.2$ phosphorylation on the *in vitro* action of deltamethrin." 36th Society of Neuroscience, Atlanta, GA. 10/14-18/2006.

20. Kong, S., K. Hestand, A. Jamal and S.B. Symington. "The effects of pyrethroid and organochlorine insecticides on mouse spermatozoa viability." 1st Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE). Washington, DC. 7/20-22/2006.

21. Catlin, N., A. Alves, J.M. Clark and S.B. Symington. "The effects of deltamethrin on mammalian voltage-sensitive calcium channels." 1st Biennial National IDeA Symposium of Biomedical Research Excellence (NISBRE). University Washington, DC. 7/20-22/2006.

22. Symington, S.B., and J.M. Clark. "Comparative toxicity of commercially available pyrethroids at rat brain presynaptic nerve terminals." 229th American Chemical Society meeting, Division of Agrochem., San Diego. 3/13-17/2005. Program No. 6.

23. Symington, S.B., and J.M. Clark. "Comparative action of cismethrin and deltamethrin on voltage-sensitive calcium channels associated with mammalian presynaptic nerve terminals." 228th American Chemical Society meeting, Division of Agrochem., Philadelphia, PA. 8/22-26/2004. Program No. 18.

24. Lee, S.H., Clark, J.M., Yoon, K.S, Gao, J.R, and S.B. Symington. "Management of head lice resistance to pyrethroids." 228th American Chemical Society meeting, Division of Agrochem., Philadelphia, PA. 8/22-26/2004. Program No. 29.

25. Frisbie, R.K., Symington, S.B., and J.M. Clark. "Actions of λ-cyhalothrin isomers on voltage-sensitive calcium channels at rat brain presynaptic nerve terminals." 228th American Chemical Society meeting, Division of Agrochem., Philadelphia, PA. 8/22-26/2004. Program No. 67.

26. Kim, H.J., Symington, S.B., Lee, S.H., and J.M. Clark. "Serial Invasive Signal Amplification Reaction for the Genotyping Permethrin-Resistant (*Kdr*-Type) Head Lice, *Pediculus Capitis.*" 228th American Chemical Society meeting, Division of Agrochem., Philadelphia, PA. 8/22-26/2004. Program No. 71.

27. Symington, S.B., and J.M. Clark. "Pyrethroid effects on voltage-sensitive calcium channels." 33rd Society of Neuroscience, New Orleans, LA. 11/8-12/2003. Program No. 166.9.

28. Symington, S.B., Frisbie, R.K., and J.M. Clark. “Comparative Toxicity of Pyrethroids on Voltage-Sensitive Calcium Channels at Rat Brain Presynaptic Nerve Terminals.” 226th American Chemical Society meeting, Division of Agrochem., New York, NY. 9/7-11/2003.

29. Symington, S.B., and J.M. Clark. “Differential Effects of T- and CS-Syndrome Pyrethroids on the Voltage-Sensitive Calcium Channels in the Rat Central Nervous System.” 224th American Chemical Society meeting, Division of Agrochem., Boston, MA. 8/18-22/2002. Abst. No. 43.

30. Frederick, K.S., Symington, S.B., and J.M. Clark. “Structure Activity Relationship of DDT and Pyrethroids on the Voltage-Sensitive Calcium Channel of *Paramecium*.” 20th Annual Meeting of the Society of Toxicology and Chemistry. Philadelphia, PA, 11/14-18/1999. Abst. No PHA152.
31. Symington, S.B., De Ondarza, J., and J.M. Clark. “Protein Modulators Alter the Swimming Behavior and Calcium Influx of *Paramecium tetraurelia.*” Federation of American Societies for Experimental Biology Summer Research Conference, Saxton River, VT, 8/7-12/1999.

32. Symington, S.B., Zhang, A., and J.M. Clark. 1998. “Pyrethroids Act as Calcium Channel Agonist in *Paramecium*.” ACS, Division of Agrochem., Boston, MA, 8/23-27/1998. Picogram. Abst. No. 55:72.

33. Clark, J.M., Symington, S.B., and J. Van Houten. “Characterization of the Action of Pyrethroids on the Ciliary Calcium Channel in *Paramecium.*” 213th ACS Nat. Meeting, Div of Agrochemistry, San Francisco, CA 4/15/1997, Picogram. Abst. No. 123.

Regional Conferences

1. Green-Gavrielidis, L., L. Palazzo, S.B. Symington. “Moving the needle on study skills: a collaboration between biology faculty and student success professionals to enhance study skills in introductory biology” SABER East, Rochester Institute of Technology, Rochester, NY. 5/29-31/2024

2. Toltin, A.C., E. Murenzi, S.B. Symington. “Rat Brain Tissue Microtransplanted into Xenopus laevis Oocytes as a Tool to Examine the Effects of Pyrethroids on Native Voltage-Sensitive Sodium Channels.” New England Society of Toxicology. Storrs, CT. 11/2014.

3. Toltin, A.C., J.M. Clark, S.B. Symington. “Validation of voltage-sensitive sodium channel isoform expression in adult and juvenile rat brain tissue microtransplanted into Xenopus oocytes.” ProteinSimple User Meeting, Boston, MA. 5/21-5/22/2014.

4. Toltin, A., Irving, C., and S.B. Symington. “Determination of voltage-sensitive sodium channel expression in rat brain tissue using automated western blotting.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

5. Irving, C., Toltin, A., and S.B. Symington. “Characterization of endogenous voltage and ligand-gated channels in microtransplanted rat brain neurolemma injected into *Xenopus* oocytes” Northeast Regional Society of Toxicology, Cambridge, MA. 9/27/2013.

6. Irving, C., Varkey, K., and S.B. Symington. “Identification of endogenous ion channels in microtransplanted rat brain neurolemma injected into *Xenopus* oocytes” 5th Annual Northeast Regional IDeA Meeting. University of Delaware, Wilmington, DE. 8/14-16/2013.

7. Gay, J.C. Bainter, W., Irving, C., Mutanguha, E.M., and S.B. Symington. “Stereospecific and structural inhibition of the human T-type voltage-sensitive calcium channel ($Ca_V3.2$) by pyrethroids.” 4th Annual Northeast Regional IDeA Meeting. Salve Regina University, Newport, RI. 8/10-12/2011.

8. Galluzzo, D., E. Mutanguha, Z. Valentine and S.B. Symington. “Deltamethrin inhibits human voltage-sensitive calcium channel isoforms expressed in *Xenopus* oocytes.” Northeast Regional Society of Toxicology, Storrs, CT. 10/15/2010.

9. Mutanguha, E. and S.B. Symington. “Structural specific inhibition of pyrethroid insecticides on the human T-type voltage-sensitive calcium channel ($Ca_v3.2$) expressed in *Xenopus* oocytes.” 4 Northeast Regional Society of Toxicology, Storrs, CT. 10/15/2010.

10. Perez, P., E. Mutanguha and S.B. Symington. “Deltamethrin accumulation in perfused *Xenopus* laevis oocytes is unaltered by $Ca_v3.2$ expression.” Northeast Regional Society of Toxicology, Storrs, CT. 10/15/2010.

11. Mutanguha, E.M., Valentine, Z., and S.B. Symington. “Structure activity relationships of pyrethroids insecticides on the human t-type voltage-sensitive calcium channel.” Rhode Island Research Alliance-Emerging Biomedical and Life Sciences Research in RI. Providence, RI. 10/2/2009.

12. Valentine, Z., Mutanguha, E.M., and S.B. Symington. “Deltamethrin inhibition of human t-type voltage-sensitive calcium channel isoforms.” 3nd Annual Northeast Regional IDeA Meeting. Dartmouth Medical School, Whitefield, NH. 8/5-7/2009.

13. Salter, D., Borges, A., Symington, S.B., and S. Kadar. “Modeling pesticide induced effects on intracellular calcium oscillations.” 3nd Annual Northeast Regional IDeA Meeting. Dartmouth Medical School, Whitefield, NH. 8/5-7/2009.

14. Mutanguha, E.M., Valentine, Z., and S.B. Symington. “Structure activity relationships of pyrethroids insecticides on the human t-type voltage-sensitive calcium channel.” 3nd Annual Northeast Regional IDeA Meeting. Dartmouth Medical School, Whitefield, NH. 8/5-7/2009.

15. Catlin, N., Mutanguha, E. and S.B. Symington. “Pyrethroid inhibition of the mammalian T-type voltage-sensitive calcium channel ($Ca_v3.2$).” Northeast Regional Society of Toxicology, Shrewsbury, MA. 10/24/2008.

16. Hestand, K., Bonheur, N., Catlin, N. and S.B. Symington. “Effects of pyrethroid and organochlorine insecticides on mouse spermatozoa and viability.” 2nd Northeast Regional IDeA Meeting. Vermont Genetics Network, Burlington VT 8/15-17/2007.

17. Hestand, K., N. Bonheur, N. Catlin, and S.B. Symington. “Pyrethroids effects on mouse spermatozoa viability and swimming behavior.” COBRE/INBRE symposium for Cancer, Development and Regenerative Medicine. Providence, RI 5/30/2007.

18. Hestand, K., N. Bonheur, N. Catlin, and S.B. Symington. “Pyrethroids effects on mouse spermatozoa viability and swimming behavior.” 65th Annual Eastern New England Biology Conference. Suffolk University, Boston, MA. 4/22/2007.

19. Kong, S., K. Hestand, A. Jamal and S.B. Symington. “Effects of insecticides on mouse spermatozoa viability.” 64th Annual Eastern New England Biology Conference. Simmons College, Boston, MA. 4/23/2006.

20. Symington, S.B., S. Kong and A. Jamal. “Characterization of deltamethrin on the viability of mouse spermatogenic cells.” Rhode Island Network for Molecular Toxicology (RI-INBRE). Providence College, Providence, RI. 1/27/2006.

21. Symington, S.B. “Characterization of pyrethroids on sperm voltage-sensitive calcium channels.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Rhode Island IDeA Network of Biomedical Excellence and Brown University’s Superfund Basic Research Program Joint Toxicology Symposium. University of Rhode Island, Kingston, RI. 6/17/2005.

V. TEACHING

TEACHING AWARDS RECEIVED

2000 University Distinguished Teaching Assistant Award, University of Massachusetts at Amherst. **“The Distinguished Teaching Award is the most prestigious prize awarded by the University of Massachusetts for excellence in classroom teaching”**

PEDAGOGICAL PRESENTATIONS

1. “Integrative Capstone; *Connecting the Core to the Biology Capstone Experience”.* Annual SRU Faculty Technology Workshop. Salve Regina University, Newport RI, 5/23/2019.

2. “The struggle with change; *so now what am I going to do in class?*” Faculty Collegium. The College of Holy Cross, Worchester, MA. 12/3/2012.

3. “Reflections of the inverted classroom.” Faculty Collegium. Salve Regina University, Newport, RI. 8/30/12

4. “Two cultures in the genomics age.” Redwood Library, Newport, RI. 3/1/2012.

5. “Content lectures vs collaborative learning: using camtasia to maximize class time with students.” Annual SRU Faculty Technology Workshop. Salve Regina University, Newport RI, 5/20/2010.

6. “A scientist’s perspective on CP Snow’s *Two Cultures*: fifty years later.” Salve Regina University, Newport, RI. 10/24/2009.

7. “Toxicological research opportunities at SRU” Salve Regina University, Newport, RI. 3/9/2005.

8. “Making the Most of Your TA Experience” University of Massachusetts Center for Teaching, University of Massachusetts, Amherst, MA. 9/1/2000.

UNIVERSITY UNDERGRADUATE COURSES TAUGHT

BCH 403 Biochemistry: (SRU) Lead Instructor, Lecture and Lab Course
BCH 404 Advanced Biochemistry: (SRU) Lead Instructor, Lecture and Lab Course
BCH 410 Pharmacology & Toxicology: (SRU) Lead Instructor Lecture and Lab Course
BIO 111 General Biology I: (SRU) Lead Instructor, Lecture and Lab Course
BIO 112 General Biology II: (SRU) Lead Instructor, Lecture and Lab Course
BIO 220 Cell Biology and Chemistry: (SRU) Lead Instructor, Lab Course
BIO 230 Biotechnology: (SRU) Lead Instructor
BIO 235 Biotechniques: (SRU) Lead Instructor, Lab Course
BIO 253 Genetics: (SRU) Lead Instructor, Lab Course
BIO 425 Neuroscience: (SRU) Lead Instructor, Lecture Course
BIO 426 Experiments in Neuroscience: (SRU) Lead Instructor, Lab Course
BIO 430 Intro to Biological Research: (SRU) Lead Instructor, Lab Course
BIO 471 Bioseminar: (SRU) Lead Instructor, Lecture Course
BIO 497 Undergraduate Research: (SRU) Research Mentor
BIO 499 Independent Study: (SRU) Course Supervisor
CHM 121 Chemistry of Human Health: (SRU) Lead Instructor Lecture and Lab Course
CHM 310 Environmental Chemistry: (SRU) Lead Instructor Lecture and Lab Course
GST 110 New Student Seminar I: (SRU) Lead Instructor Lecture Course
GST 112 New Student Seminar II: (SRU) Lead Instructor Lecture Course
UNV101 Neuroculture: (SRU) Lead Instructor Lecture, Pell Honors Course
UNV102 Neuroculture: (SRU) Lead Instructor Lecture, Pell Honors Course
ENV 315 Principles in Environmental Toxicology and Chemistry: (Umass) Lead Instructor Lecture

UNIVERSITY GRADUATE COURSES TAUGHT

ENV 535 Methods in Environmental Toxicology and Chemistry
ENT 585 Toxicology of Insecticides

UNIVERSITY TEACHING ASSISTANTSHIPS

ENV 100 Environmental Science Introductory Lecture Series 1
ENV 101 Environmental Science Introductory Lecture Series 2
ENV 305 Methods of Pollution Measurement,
ENV 315 Principles in Environmental Toxicology and Chemistry
ENV 535 Methods in Environmental Toxicology and Chemistry
ENT585 Toxicology of Insecticides

VISITING RESEARCH SCHOLARS

Dr. J. Marshall Clark, Spring 2006. Professor and Director of Massachusetts Pesticide Analysis Laboratory, Department of Veterinary and Animal Sciences, University of Massachusetts, Amherst, MA 01003.

GRADUATE STUDENTS TRAINED (4 TOTAL GRADUATE STUDENTS TRAINED)

Abigail Toltin. 2021. Project title “Development of a high-throughput assay to assess the effects of pyrethroids on voltage-sensitive sodium channel isoforms” Biomedical Engineering and Biotechnology. University of Massachusetts – Dartmouth. *Serve as a graduate committee member.*

Edwin Murenzi. 2016. Project title “Development of a high-throughput assay to assess the effects of pyrethroids on voltage-sensitive sodium channel isoforms” Molecular and Cellular Biology Program. University of Massachusetts – Amherst. *Serve as a graduate committee member.*

Anna-Marie Alves. 2011. Project title “Action of deltamethrin is altered by phorbol ester (PMA)-activated PKC phosphorylation of voltage-gated calcium channel, $Ca_v2.2$, from rat brain” Molecular and Cellular Biology Program. University of Massachusetts – Amherst. *Served as a graduate committee member.*

Hillary E. Hodgdon. 2008. Project title “Binary mixtures of pyrethroids interact between voltage-sensitive calcium and chloride channels in isolated presynaptic nerve terminals from rat brain.” Department of Veterinary and Animal Sciences, Animal Biotechnology and Biomedical Sciences, University of Massachusetts – Amherst. *Served as a graduate committee member.*

UNDERGRADUATE STUDENT TRAINED (45 TOTAL UNDERGRADUATE STUDENTS TRAINED)

Kiara Son-Has, 2019 – 2021. Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Awards: Rhode Island Summer Undergraduate Research Fellowship (2018)
Position after graduation: NIH Post-Bac program

Anna Johnson-Taylor, 2019 – 2020. Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Awards: Department of Biology Award
Position after graduation: PA School

Chandler Da Cruz, 2019 – 2020. “Effects of imidocloprid to adult *Drosophila* in a contact bioassay.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Lab technician, Broad Institute, Boston MA

Samantha Esper, 2019 – 2020. “Piperine alters deltamethrin toxicity to *Drosophila*.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Biologist, Smithers Environmental Risk Sciences Division, Providence, RI.

Randi Barbon, 2018 – 2020. “Development of HEPG2 Cell Lines Deficient in Phosphorylation Signaling.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Awards: Rhode Island Summer Undergraduate Research Fellowship (2018)
Position after graduation: unknown

Cole Tindall, 2018 – 2020. “Development and Isolation of Ion Channel Knockouts in HEPG2 Cell Lines using CRISPR-Cas9.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Awards: Rhode Island Summer Undergraduate Research Fellowship (2018, 2019)
Position after Graduation: Postbac researcher, National Institutes of Health.

Tess Puopolo, 2018 – 2020. “Toxicological Significance of Diamide Antibiotics.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2018, 2019)

Position after Graduation: Graduate Student, University of Rhode Island, Neuroscience.

Victoria Dill, 2018 – 2019. “Development of a Drosophila Contact Bioassay to Investigate the Toxicity of Pyrethroid Insecticides.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Medical Assistant, Emerson Hospital, Boston MA.

Emily Kahler, 2018 – 2019. “CRISPR Cas9 as a Tool to Construct Calcium Channel Knockouts in HEPG2 cells.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, Chiropractic School. University of Western States.

Awards: Yale University Summer Undergraduate Research Fellowship (2018)

Jillian Mosca, 2018 – 2019. “Production and Purification of Drosophila cRNA.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Phlebotomist, New York Hospital, NY.

Lauren Benoit, 2018 – 2019. “Characterization of cRNA from PFOS treated Drosophila.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: EMT, Boston, MA.

Ricky Tegtmierer, 2018 – 2019. “Construction of a nicotinic AChR knockout using CRISPR Cas-9” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, Cornel University, Utica NY.

Awards: Cornel University Summer Undergraduate Research Fellowship (2018)

Matthew Gingras, 2015. “Characterization of rat brain tissue microtransplanted into *Xenopus laevis* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Unknown

Awards: Rhode Island Summer Undergraduate Research Fellowship (2015)

Morrissey 2015. “Expression of Voltage-Sensitive Sodium Channels (VSSCs) in Developing Rat Brain.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Laboratory Technician, UT Southwestern Medical Center, Dallas TX.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2015)

Heather Conboy 2012-2016 “Characterization of $Ca_v1.3$ in Rat Brain Neurolemma Mictrotransplated Oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, Brown University, Providence RI.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2013, 2014, 2015). Winner of the New England Institute of Chemists Award (2015),

Stephanie Beels, 2012. “Evaluation of pesticide interaction with lipase using molecular docking tools.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Unknown

Paul Diss 2011 – 2013. “Evaluation of pyrethroid binding using autodock.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Chemistry Graduate Student, University of Maryland, MD.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011, 2012). Winner of the New England Institute of Chemists Award (2013),

Craig Irving, 2011 – 2014. “Expression and characterization of human $Ca_v2.2$ in *Xenopus* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Neuroscience Graduate Student, University of Rhode Island, Kingston, RI

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011, 2012, 2013) Undergraduate poster competition winner at the 4th annual Northeast Undergraduate Research and Development Symposium.

Karl Varkey, 2011 – 2014. “Pyrethroid Modulation of Human $Ca_v1.2$ in *Xenopus* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate School in Europe

Awards: Rhode Island Summer Undergraduate Research Fellowship (2012, 2013)

Melanie Sherlock, 2011 – 2013. “Computational approach to ligand binding to the glutamate receptor.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Pharmacy Graduate Student, Regis University, Denver, CO.

Wayne Bainter, 2011 – 2013. “Expression and characterization of human $Ca_v3.1$ in *Xenopus* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Lab Technician, Boston Children’s Hospital, Boston, MA.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011, 2012), Undergraduate poster competition winner at the 4th annual Northeast Undergraduate Research and Development Symposium. Undergraduate poster competition winner at the 6th Annual BioNES Conference. Leo Bottari Jr Research Award (2013)

Justin Gay, 2011 – 2013. “Expression and characterization of human $Ca_v3.3$ in *Xenopus* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Unknown

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011, 2012), Undergraduate poster competition winner at the 4th annual Northeast Undergraduate Research and Development Symposium. Undergraduate poster competition winner at the 6th Annual BioNES Conference.

Priscilla Villa, 2011. “Pyrethroid modulation of mouse neocortical cell development.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Neuroscience Graduate Student, University of Rhode Island, Kingston RI.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011), Peter Antone Senior Service Award (2013)

Hanna Cote, 2011 – 2012. “Heavy metal identification in soil samples collected from the Melville pond watershed.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Lab Technician, Elliot Hospital, Manchester, NH.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011)

Lindsay Watts, 2011 – 2012. “A survey of heavy metal concentrations in water and silt samples collected from Melville Pond.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Environmental Scientist at Water Testing Company

Awards: Rhode Island Summer Undergraduate Research Fellowship (2011), Winner of the New England Institute of Chemists Award (2012),

Stephanie Savino, 2011 – 2012. “Characterization of mouse hippocampal neuronal development.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Ohio State University (Veterinary Medicine)

Awards: Pell Honors Student

Priscilla Perez, 2010 – 2011. “Determination of deltamethrin concentrations extracted from *Xenopus* oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Current Position: Unknown

Awards: Rhode Island Summer Undergraduate Research Fellowship (2010)

Glenna Kohl Scholarship Award Winner (2010-2011), Student Organization Award (2011)

Daniela Galluzzo, 2009 – 2011. “Cloning and expression of $Ca_v3.3$ in Xenopus oocytes.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation Medical School, University of Mulansf

Awards: Rhode Island Summer Undergraduate Research Fellowship (2010)

Mandy Letourneau, 2009 – 2010. “Development of an amperometric detection method to monitor dopamine concentrations.” Department of Chemistry, Salve Regina University, Newport RI.

Position after Graduation: Smithers and Springborn Laboratories, Wareham MA

Awards: Undergraduate poster competition winner at the 4^{th} Annual BioNES Student Poster Competition

Matthew Petrilli, 2009 – 2010. “Simulated docking of pyrethroids to the $\beta\gamma$-subunit of G-proteins.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Medical School, American University of the Caribbean

Krystal LaPorte, 2009 – 2010. “G-protein $\beta_1\gamma_2$ expression in Sf9 cells.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Medical Technician, Rhode Island Hospital, Providence, RI

Jessica Faiteau, 2009 – 2010. “Development of a neuronal outgrowth assay using PC12 cells.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Laboratory Sales Representative, Meditech Labs, Newton, MA.

Zachary Valentine, 2009 – 2011. “Deltamethrin inhibition of voltage-gated Ca_v3 isoforms.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Laboratory Technician, Monsanto Chemical Company

Awards: Rhode Island Summer Undergraduate Research Fellowship (2009, 2010)

Alison Shea, 2007 – 2011. “Whole cell recording of human voltage-sensitive calcium channels using HEK cells.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Laboratory Technician, Axelon Pharmaceuticals

Awards: Rhode Island Summer Undergraduate Research Fellowship (2009)

Edwin Mutanguha, 2007 – 2011. "Structure activity relationships of pyrethroids insecticides on the human t-type voltage-sensitive calcium channel." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, Molecular and Cellular Biology Program, University of Massachusetts at Amherst

Awards: Rhode Island Summer Undergraduate Research Fellowship (2008, 2009, 2010), Best Student poster at the Northeast Society of Toxicology Meeting, Storrs, CT 10/15/2010, Winner of the American Institute of Chemists Award (2011), Peter Antone Service Award for seniors (2011), Assistant Editor for The Undergraduate Journal, *Impulse* (2011).

Jeremy Osborne, 2007 – 2010. "Development of a neurotransmitter release assay using PC12 cells to measure the effects of environmental pollutants." Department of Chemistry, Salve Regina University, Newport RI.

Position after Graduation: Pharmacy technician, CVS

Deanna Salter, 2007 – 2010. "Development of a calcium influx assay using PC12 cells to measure the effects of environmental pollutants." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, Department of Pharmaceutical Sciences, University of Rhode Island, Kingston, RI.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2008, 2009)

Alexander LaVecchia, 2006 – 2009. "SELDI-TOF characterization of pyrethroid binding sites associated with heterotrimeric G-proteins." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Graduate Student, The Pratt Institute, Brooklyn, NY.

Michael Dulac, 2007 – 2008. "Cloning of mouse $Ca_v3.1$ into a *Xenopus* expression vector." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Technician, Hospital of St. Raphael, New Haven, CT.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2008)

Natasha Catlin, 2005 – 2008. "Effects of deltamethrin on the $Ca_v3.2$ voltage sensitive calcium channel in expressed in *Xenopus* oocytes." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Ph.D. candidate at Brown University, Department of Pathobiology and Laboratory Medicine, Providence, RI.

Awards: 2nd place Northeast Regional Society of Toxicology Research Poster Competition
1st Place at the 2nd Annual BioNES Student Presentation Competition
Society of Toxicology-Undergraduate Toxicology Education Award
Student Award for Student Association of Interdisciplinary Life Sciences
Awards: Rhode Island Summer Undergraduate Research Fellowship (2007, 2008)

Nathalie Bonheur, 2006 – 2008. "Effect of pyrethroids on the capacitation of mouse spermatozoa." Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.

Position after Graduation: Lab Technician, Whitehead Institute, Boston MA.

Awards: Rhode Island Summer Undergraduate Research Fellowship (2007)

Kristen Hestand, 2006 – 2008. “The effect of insecticides mouse spermatozoa motility.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Medical Technician, University of North Carolina
Awards: Rhode Island Summer Undergraduate Research Fellowship (2006, 2007)
John X. Kerins Award (Spring 2009)

Anna-Marie Alves, 2006.” Effects of deltamethrin on $Ca_v3.1$.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Laboratory Technician, Harvard University
Awards: Rhode Island Summer Undergraduate Research Fellowship (2006)

Sophanna Kong, 2005 – 2006. “The effect of insecticides mouse spermatozoa viability.” Department of Biology and Biomedical Sciences, Salve Regina University, Newport RI.
Position after Graduation: Technician at Pulmatrix Inc, Boston MA

PUBLISHED ABSTRACTS AT UNDERGRADUATE CONFERENCES

1. Son-Has, and S.B. Symington. “Effect of Imidacloprid and a High Sugar Diet on *Drosophila* Development .” 13 Annual Rhode Island Summer Undergraduate Research Fellows Conference. University of Rhode Island. 7/31/2021.

2. Puopolo, T., Symington, S.B. and C. Reid. “Toxicological Significance of Diamide Antibiotics.” 11 Annual Rhode Island Summer Undergraduate Research Fellows Conference. University of Rhode Island. 7/27/2018.

3. Babon, R., Tindall, C., and S.B. Symington. “Development of HEPG2 Cell Lines Deficient in Phosphorylation Signaling.” 11 Annual Rhode Island Summer Undergraduate Research Fellows Conference. University of Rhode Island. 7/27/2018.

4. Tindall, C. Babon, R. and Steven B. Symington. “Development and Isolation of Ion Channel Knockouts in HEPG2 Cell Lines using CRISPR-Cas9.” 11 Annual Rhode Island Summer Undergraduate Research Fellows Conference. University of Rhode Island. 7/27/2018.

5. Gingras M., H. Conboy, A.C. Toltin, S.B. Symington. “Characterization of rat brain tissue microtransplanted into *Xenopus laevis* oocytes.” 8th annual Rhode Island summer undergraduate research fellows conference, North Kingstown, RI. 7/31/2015.

6. Morrissey J.P., A.C. Toltin, S.B. Symington. “Expression of Voltage-Sensitive Sodium Channels (VSSCs) in Developing Rat Brain.” 8th annual Rhode Island summer undergraduate research fellows conference, North Kingstown, RI. 7/31/2015.

7. Neff S., A.C. Toltin, S.B. Symington. “Functional characterization of voltage sensitive calcium channels microtransplanted to *Xenopus laevis* oocytes.” 7th annual Rhode Island summer undergraduate research fellows conference, North Kingstown, RI. 8/1/2014.

8. Irving, C.M., and S.B. Symington. “Reconstitution of Rat Brain Voltage and Ligand Gated Ion Channels into *Xenopus leavis* Oocytes.” 6th Annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/8-9/2014.

9. Crowther, T. Symington, S.B., and A. Shakarian. “Characterization of Lipase Activity using an HA Epitope Tagged LdLip3 Expressed Protein” 6th Annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/8-9/2014.

10. Douglas, K.L., Symington, S.B., and A. Shakarian. “Using Amplified Fragment Length Polymorphism to Determine the Categorization of Leishmania” 6th Annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/8-9/2014.

11. Ortiz, C., Symington, S.B, and A.M. Shakarian. “Differentiation of Pathogenic Leishmania Species through Amplified Fragment Length Polymorphism (AFLP) Analysis.” 6th Annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/8-9/2014.

12. Conboy, H.L., and S. B. Symington; “Characterization of Voltage Dependent L-Type Calcium Channel Currents in *Xenopus* Oocytes.” 6th Annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/8-9/2014.

13. Irving, C., and S.B. Symington. “Reconstitution of Rat Brain Voltage and Ligand Gated Ion Channels into *Xenopus leavis* Oocytes.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

14. Neff, S., and S.B. Symington. “Neurolemma-Injected *Xenopus* oocytes as a tool to study $Ca_v2.2$.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

15. Conboy, H.L., and S.B. Symington. “Characterization of voltage dependent L-type calcium channel currents in Xenopus.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

16. Ortiz, C., Symington, S.B., and A.M. Shakarian. “Differentiation of pathogenic Leishmania species through amplified fragment length polymorphism (AFLP) analysis.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

17. Douglas, K., Symington, S.B., and A.M. Shakarian. “Using amplified fragment length polymorphism to determine the categorization of Leishmania.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

18. Marvel, S., Symington, S.B., and A.M. Shakarian. “Using the AFLP technique to detect differences in gene expression of Leishmania.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

19. Crowther, T., Symington, S.B., and A.M. Shakarian. “Characterization of lipase activity using an HA epitope tagged LdLip3 expressed protein.” 7th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/3/2013.

20. Ortiz, C., Symington, S.B., and A. Shakarian. “Alison Amplified Fragment Length Polymorphism (AFLP) Analysis Of Leishmania DNA.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

21. Conboy, H.L., and S.B. Symington. “Characterization of $Ca_v1.3$ in Rat Brain Neurolemma Mictrotransplated Oocytes.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

22. Crowther, T., Symington, S.B., and A. Shakarian. Expression of An LdLIP3 Fusion Protein in *Leishmania donovani*.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

23. Irving, C., and S.B. Symington. “Deltamethrin Modulates Rat Brain Ion Channel Currents Microtransplanted in *Xenopus laevis* Oocytes.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

24. Marvel, S., Symington, S.B., A. Shakarian. “Detecting Differences In Gene Expression Of Leishmania By AFLP.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

25. Neff, S., and S.B. Symington. “Mictrotransplantation Of $Ca_v2.2$ into *Xenopus* Oocytes.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

26. Varkey, K., and S.B. Symington. Deltamethrin Stimulated Neurotransmitter Release in Neurolemma injected *Xenopus laevis* Oocytes. Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/2/2013.

27. Gay, J.C., Bainter, W., and S.B. Symington. “T-type voltage-sensitive calcium channels are differentially inhibited by pyrethroid insecticides.” 5th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/1-2/2013.

28. Irving, C., and S.B. Symington. “Use of microtransplanted neurolemma to examine ligand-gated channel function.” 5th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/1-2/2013.

29. Diss, P., and S.B. Symington. “A computational approach to determine the binding site if pyrethroids to the $\beta\gamma$-subunit of heterotrimeric G-proteins.” 5th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/1-2/2013.

30. Bainter, W., Gay, J.C., Irving, C., and S.B. Symington. “Stereospecific inhibition of the human T-type voltage-sensitive calcium channel isoforms by pyrethroids.” 5th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/1-2/2013.

31. Varkey, K., Irving, C., and S.B. Symington. “Expression of the human N-type calcium channel in Xenopus oocytes” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer

Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/27/2012.

32. Irving, C., Bainter, W., Gay, J., and S.B. Symington. “Characterization of endogenous voltage- and ligand-gated channels in microtransplanted rat brain neurolemma injected into Xenopus oocytes” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/27/2012.

33. Diss, P., and S.B. Symington. “A computational approach to determine the binding site if pyrethroids to the $\beta\gamma$-subunit of heterotrimeric G-proteins” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/27/2012.

34. Beels, S., Symington, S.B., and A.M. Shakarian. “Using a computational approach to identify potential inhibitors of the *Leismania donovani* lipase, LDLIP3” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/27/2012.

35. Bainter, W., Gay, J., and S.B. Symington. “Pyrethroid modulation of T-type voltage-sensitive calcium channels” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/27/2012.

36. Diss, P. and S.B. Symington. “Computational approaches to characterize receptor ligand interactions.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

37. Savino, S. and S.B. Symington. “Development and evaluation of a mouse neocortical cells neurodevelopment assay to assess the effects of pyrethroids.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

38. Varkey, K., Irving, C. and S.B. Symington. “Human N-type calcium channel expression in *Xenopus laevis* oocytes.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

39. Beels, S. and S.B Symington. “Molecular Modeling: History and Benefits” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

40. Bainter, W., Gay, J.C., and S.B. Symington. “Pyrethroid Modulation of T-type Voltage-Sensitive Calcium Channel Isoforms.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

41. Cote, H., Watts, L., Chace, J. and S.B. Symington. “Heavy Metal Identification in Soil Samples Collected from the Melville Pond Watershed.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

42. Watts, L., Cote, H., Chace, J., and S.B. Symington. “A survey of heavy metal concentrations in water and silt samples collected from Melville Pond.” 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

43. Gay, J.C., Bainter, W., Irving, C., and S.B. Symington. Stereospecific inhibition of the human T-type voltage-sensitive calcium channel isoforms by pyrethroids. 3rd annual SRyou Symposium, Salve Regina University, Newport, RI 3/23/2012.

44. Irving. C, and S.B. Symington. “Characterization and expression of the human N-type voltage-sensitive calcium channel ($Ca_v2.2$) into Xenopus laevis oocytes.” 4th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/10-11/2012.

45. Cote, H., Watts, L., Chace, J. and S.B. Symington. “Heavy metal identification in soil samples collected from the melville pond watershed.” 4th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/10-11/2012.

46. Bainter, W., Gay, J.C. and S.B. Symington. “T-type voltage-sensitive calcium channels are differentially inhibited by pyrethroid insecticides.” 4th annual Northeast Undergraduate Research and Development Symposium. University of New England, Biddeford, ME 3/10-11/2012.

47. Symington, S.B. “Stereospecific and structural inhibition of the human T-type voltage-sensitive calcium channel isoforms by pyrethroids.” Rhode Island Network for Molecular Toxicology (RI-INBRE). Providence College, Providence, RI. 1/27/2012.

48. Florence, A.M., Savino, S.I. and S.B. Symington. “IMPULSE and Social Networking: extending the global reach.” 6th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2011.

49. Gay, J.C., Bainter, W., and S.B. Symington. “T-type voltage-sensitive calcium channels are differentially inhibited by pyrethroid insecticides.” 6th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2011.

50. Irving, C., and S.B. Symington. “Characterization and expression of the human N-type voltage-sensitive calcium channel ($Ca_v2.2$) in *Xenopus laevis* oocytes.” 6th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2011.

51. Cote, H., Watts, L., Andrie, K., Chance, J., and S.B. Symington. “A survey of heavy metal concentrations in water and silt samples collected from Melville Pond.” 6th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2011.

52. Watts, L., Cote, H., Andrie, K., Kadar, S., Chace, J., and S.B. Symington. “A survey of heavy metal concentrations in water and silt samples collected from Melville Pond.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/30/2011.

53. Villa, P., Josephs, R.T., and S.B. Symington. “Measurement of intracellular calcium dynamics in mouse neocortical cells exposed to pesticides.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/30/2011.

54. Bainter, W., Gay, J.C., Mutanguha., E.M., and S.B. Symington. “Pyrethroid modulation of T-type voltage-sensitive calcium channel isoforms.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/30/2011.

55. Irving, C., and S.B. Symington. “Co-expression of α_1 and β_3 subunits of the human N-type voltage-sensitive calcium channel ($Ca_v2.2$) into *Xenopus laevis* oocytes.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/30/2011.

56. Mutanguha, E.M., and S.B. Symington. “Structural specific modulation of human T-type voltage sensitive calcium channel ($Ca_V3.2$) by pyrethroid insecticides.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

57. Perez, P., Mutanguha, E. M., and S.B. Symington. “Deltamethrin accumulation in perfused *Xenopus laevis* oocytes.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

58. McCormack, K.W., Symington, S.B. and A.M. Shakarian. “A comparative study of *Leishmania donovani* and *Leishmania mexicana* using amplified fragment length polymorphism.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

59. Kelly, W., Symington, S.B. and A.M. Shakarian. “Comparing genetic relatedness using amplified fragment polymorphism to differentiate between *Leishmania donovani* and *Leishmania mexicana.*” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

60. Hurlburt, A.V., Symington, S.B. and A.M. Shakarian. “Genetic polymorphisms of *Leishmania donovani* and *Leishmania mexicana*.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

61. Dagliere, B., Shakarian, A.M. and S.B. Symington. “Comparative polymorphic bands through amplified fragment length polymorphism (AFLP) analysis of *L.donovani* and *L.mexicana* genomic DNA.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

62. Bainter, W., Symington, S.B. and A.M. Shakarian. “Genetic comparison of *Leishmania donovani* and *Leishmania mexicana* using amplified fragment length polymorphism.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

63. Tobin, M., Shakarian, A.M. and S.B. Symington. “The use of amplified fragment length polymorphism techniques to provide a comparison between old world and new world *Leishmania.*” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

64. Hoertz, L., Symington, S.B. and A.M. Shakarian. “Using amplified fragment length polymorphism to compare species of *Leishmania.*” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

65. Gay, J., Shakarian, A.M. and S.B Symington. “Student reproducibility of amplified fragment length polymorphism using *Leishmania donovani and Leishmania mexicana.*” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

66. Davis, A., Shakarian, A.M. and S.B. Symington. “A genetic analysis of “old world” *Leishmania donovani* and “new world” *Leishmania mexicana* with the use of amplification fragment length polymorphism.” 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

67. Black, R.D., Shakarian, A.M. and S.B. Symington. “Using amplified fragment length polymorphism

to analyze the genetic relatedness of *L. donovani* and *L. mexicana.*" 2nd annual SRyou Symposium, Salve Regina University, Newport, RI 3/25/2011.

68. Valentine, Z., and S.B. Symington. "A novel method to increase protein expression of voltage-sensitive ion channels in *Xenopus* oocytes." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

69. Galluzzo, D., M. Galluzzo, E. Mutanguha, and S.B. Symington. "Differential inhibition of T-type voltage-sensitive calcium channels ($Ca_V2.3$ and $Ca_V3.3$) by deltamethrin." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

70. Mutanguha, E. and S.B. Symington. "Competitive inhibition by pyrethroid insecticides on the T-type voltage-sensitive calcium channel $Ca_V3.2$." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

71. Perez, P., E. Mutanguha, and S.B. Symington. "Determination of deltamethrin concentrations extracted from perfused *Xenopus laevis* oocytes." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

72. Borges, A., D. Salter, S. Kadar and S.B. Symington. "Validation of an *in silico* mathematical model used to predict internal calcium dynamics and assess the physiological consequences of extracellular stimuli on PC12 Cells." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

73. Andrie, K., S. Kadar and S.B. Symington. "Development and evaluation of a fura-2 fluorescent assay to assess intracellular dynamics of PC12 cells." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 7/31/2010.

74. LaPorte, K., and S.B. Symington. "G-protein β1γ2 expression in Sf9 cells." 2nd Annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

75. Savino, S., Symington, S.B. and A.M. Shakarian. "Genome comparison of old world *Leishmania* species using amplified fragment length polymorphism." 2nd annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

76. Florence, A., Symington, S.B., and A.M. Shakarian. "Genome comparison of an old world and new world *Leishmania* species using amplified fragment length polymorphism." 2nd annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

77. Fuller, E., Symington, S.B., and A.M. Shakarian. "Genome comparison of *Leishmania donovani* and *Leishmania mexicana* using amplified fragment length polymorphism." 2nd annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

78. Perez, P., Symington, S.B., and A.M. Shakarian. "Genome comparison of *Leishmania donovani* and

Leishmania major using amplified fragment length polymorphism." 2nd annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

79. Faiteau, J. and S.B. Symington. "Development of a neuronal outgrowth assay using PC12 cells." 2nd annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 4/17-18/2010.

80. Mutanguha, E.M. and S.B. Symington. "Differential inhibition of the human T-type voltage-sensitive calcium channel ($Ca_v3.2$) by pyrethroid insecticides." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

81. Salter, D., A. Borges, S.B. Symington, and S. Kadar. "Experimental validation of a theoretical mathematical model of internal calcium dynamics of PC12 cells." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

82. Farmer, L., Symington, S.B. and A.M. Shakarian. "Determining the DNA banding patterns of different *Leishmania* species using AFLP." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

83. Letourneau, M., D. Salter, S. Kadar, and S.B. Symington. "Development of amperometric detection method to monitor dopamine concentrations." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

84. Valentine, Z. and S.B. Symington. "Deltamethrin inhibition of voltage-gated Ca_v3 isoforms." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

85. Savino, S., Symington, S.B. and A.M. Shakarian. "Genomic fingerprinting of parasitic *Leishmania donovani.*" 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

86. Wright, M., Symington, S.B. and A.M. Shakarian. "Comparing labeled DNA fragments of *Leishmania s*pecies." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

87. Florence, A., Shakarian, A.M., and S.B Symington. "Genome comparison of an *Leishmania major* and *Leishmania mexicana* using amplified fragment length polymorphism." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

88. Fuller, E., Shakarian, A.M., and S.B. Symington. "Genomic DNA species specific virulence factors in *Leishmania mexicana.*" 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

89. Perez, P., Shakarian, A.M., and S.B. Symington. "Using AFLP DNA fingerprinting to compare DNA strains of *L. mexicana*, *L. donovani*, and *L. major*." 1st annual SRyou Symposium. Salve Regina University, Newport, RI 3/36/2010.

90. Mutanguha, E.M., Valentine, Z., and S.B. Symington. "Structure activity relationships of pyrethroids insecticides on the human t-type voltage-sensitive calcium channel." Rhode Island Network for Molecular Toxicology (RI-INBRE). Providence College, Providence, RI. 1/29/2009.

91. Valentine, Z. and S.B. Symington. "Deltamethrin inhibition of voltage-gated Ca_v3 isoforms." Rhode Island Network for Molecular Toxicology (RI-INBRE). Providence College, Providence, RI.

1/29/2009.

92. Mutanguha, E.M. and S.B. Symington. “Differential inhibition of the human T-type voltage-sensitive calcium channel ($Ca_v3.2$) by pyrethroid insecticides.” 4th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/4/2009.

93. Salter, D., A. Borges, S.B. Symington, and S. Kadar. “Experimental validation of a theoretical mathematical model of internal calcium dynamics of PC12 cells.” 4th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/4/2009.

94. Letourneau, M., D. Salter, S. Kadar, and S.B. Symington. “Development of amperometric detection method to monitor dopamine concentrations.” 4th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/4/2009.

95. Petrilli, M. and S.B. Symington. “Simulated docking of pyrethroids to the $\beta\gamma$-subunit of G-proteins.” 4th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/4/2009.

96. Valentine, Z. and S.B. Symington. “Deltamethrin inhibition of voltage-gated Ca_v3 isoforms.” 4th Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/4/2009.

97. Valentine, Z., Mutanguha, E.M., and S.B. Symington. “Deltamethrin inhibition of human t-type voltage-sensitive calcium channel isoforms.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

98. Tobin, M., Shakarain, A.M., and S.B. Symington. “Identification, cloning and sequencing of the actin gene from the lizard parasite *Leishmania tarentolea*.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

99. Shea, A.M., and S.B. Symington. “Expression of $Ca_v3.2$ in HEK cells.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

100. Salter, D., Borges, A., Symington, S.B., and S. Kadar. “Modeling pesticide induced effects on intracellular calcium oscillations.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

101. Mutanguha, E.M., Valentine, Z., and S.B. Symington. “Structure activity relationships of pyrethroids insecticides on the human t-type voltage-sensitive calcium channel.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

102. Letourneau, M., Salter, D., Kadar, S. and S.B. Symington. “Development of an amperometric detection method to monitor dopamine concentrations.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of

Rhode Island, Kingston, RI. 8/3/2009.

103. Charette, N., Symington, S.B., and A.M. Shakarain. "Identification, cloning and sequencing of the β-tubulin gene from the lizard parasite *Leishmania tarentolea*." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

104. Borges, A., Salter, D., Kadar, S. and S.B. Symington. "Modeling catecholamine secretion using a comprehensive mechanism for intracellular oscillations." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Fellowship Conference. University of Rhode Island, Kingston, RI. 8/3/2009.

105. Borges, A.A., S. Kadar, and S.B. Symington. "An exploration of a comprehensive mechanism for intracellular calcium oscillations." 1st annual Northeast Research and Development Symposium. University of New England, Biddeford, ME. 3/27-29/2009.

106. Mutanguha, E.M., Shea, A.M., Catlin, N.R., and S.B. Symington. "Pyrethroids structure activity relationship on the human T-type voltage-sensitive calcium channel ($Ca_V3.2$)." 1st annual Northeast Research and Development Symposium. University of New England, Biddeford, ME. 3/27-29/2009.

107. Shea, A.M. and S.B. Symington. "Expression of Cav3.2 in HEK cells." 1st annual Northeast Research and Development Symposium. University of New England, Biddeford, ME. 1st annual Northeast Research and Development Symposium. University of New England, Biddeford, ME. 3/27-29/2009.

108. Salter, D., Osborne, J., and S.B. Symington. "Simultaneous measurement of calcium influx and dopamine release in differentiated PC-12 cells." 1st annual Northeast Research and Development Symposium. University of New England, Biddeford, ME 3/27-29/2009.

109. Catlin, N.R., Mutanguha, E. and S.B. Symington. "Structure activity relationship of pyrethroids on the human T-type voltage-sensitive calcium channel." 48th Annual Society of Toxicology. Baltimore, MD. 3/19/2009. Abstract #2129.

110. Mutanguha, E.M., Shea, A.S., Catlin, N., and S.B. Symington. "Structure activity relationship of pyrethroids on the human T-type voltage-sensitive calcium channel ($Ca_V3.2$)." Rhode Island Network for Molecular Toxicology (RI-INBRE). Roger Williams University, Bristol, RI. 1/30/2009.

111. Borges, A.A., Beltramini, A.J., Symington, S.B., and S. Kadar. "An exploration of a comprehensive mechanism for intracellular calcium oscillations." 3rd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2008.

112. Mutanguha, E., Catlin, N., and S.B. Symington. "Pyrethroid modulation of human T-type voltage-sensitive calcium channel." 3rd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2008.

113. Salter, D., Hestand, K. and S.B. Symington. "Pesticide effects on mouse spermatozoa motility." 3rd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 12/2/2008.

114. Borges, A., Kadar, S. and S.B. Symington. "An exploration of a comprehensive mechanism for

intracellular calcium oscillations." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/4/2008.

115. Beltramini, A. Kadar, S. and S.B. Symington. "Development of a Comprehensive Model with Biphasic Regulation for Intracellular Ca^{2+} Dynamics." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/4/2008.

116. Catlin, N., Mutanguha, E. and S.B. Symington. "Pyrethroid inhibition of the mammalian T-type voltage-sensitive calcium channel ($Ca_v3.2$)." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/4/2008.

117. Salter, D., DuLac, M., Bonheur, N., Hestand, K., and S.B. Symington. "Pyrethroid effects on mouse spermatozoa motility and capacitation." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/4/2008.

118. DuLac, M., Catlin, N., and S.B. Symington. "Cloning of mouse $Ca_v3.1$ into a *Xenopus* expression vector." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/4/2008.

119. Hestand, K., Bonheur, N., Catlin, N. and S.B. Symington. "Effects of pyrethroid and organochlorine insecticides on mouse spermatozoa and viability." Rhode Island Network for Molecular Toxicology (RI-INBRE). Rhode Island College, Providence, RI. 1/25/2008.

120. Hestand, K., and S.B. Symington. "Utilization of a Motility Assay to Examine the Effects of Pesticides on Mouse Spermatozoa." 2nd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 11/30/2007.

121. Bonheur, N., and S.B. Symington. "Effect of deltamethrin and DDT on BSA-capacitated spermatozoa." 2nd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 11/30/2007.

122. Catlin, N., and S.B. Symington. "Deltamethrin inhibits the human T-type voltage-sensitive calcium channel." 2nd Annual Biology New England South Undergraduate Research Conference (BioNES). Roger Williams University, Bristol, RI 11/30/2007.

123. Bonheur, N., and S.B. Symington. "Effect of deltamethrin and DDT on BSA-capacitated spermatozoa." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2007.

124. Catlin, N., and S.B. Symington. "Deltamethrin inhibits the human T-type voltage-sensitive calcium channel." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2007.

125. Hestand, K., and S.B. Symington. "Development of a fluorescent viability assay to measure the effect of insecticides on mouse spermatozoa." Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2007.

126. Hestand, K., N. Bonheur, N. Catlin, and S.B. Symington. “Pyrethroids effects on mouse spermatozoa viability and swimming behavior.” COBRE/INBRE symposium for Cancer, Development and Regenerative Medicine. Providence, RI 5/30/2007.

127. Hestand, K., N. Bonheur, N. Catlin, and S.B. Symington. “Pyrethroids effects on mouse spermatozoa viability and swimming behavior.” 65th Annual Eastern New England Biology Conference. Suffolk University, Boston, MA. 4/22/2007.

128. Symington, S.B. “Deltamethrin decreases the viability but not the motility of mouse spermatozoa.” Rhode Island Network for Molecular Toxicology (RI-INBRE). Salve Regina University, Newport, RI. 1/26/2007.

129. Kong, S., K. Hestand, A. Jamal and S.B. Symington. “Development of methodologies to determine the effects of insecticides on mouse spermatozoa viability.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2006.

130. Hestand, K., S. Kong, A. Jamal and S.B. Symington. “Development of methodologies to determine the effects of insecticides on mouse spermatozoa motility.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2006.

131. Catlin, N., A. Alves, J.M. Clark and S.B. Symington. “The effects of deltamethrin on mammalian voltage-sensitive calcium channels.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/10/2006.

132. Symington, S.B., S. Kong, K. Hestand and A. Jamal “Effects of insecticides on mouse spermatozoa viability and motility.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Rhode Island Network for Molecular Toxicology. University of Rhode Island, Kingston, RI. 6/16/2006.

133. Kong, S., K. Hestand, A. Jamal and S.B. Symington. “Effects of insecticides on mouse spermatozoa viability.” 64th Annual Eastern New England Biology Conference. Simmons College, Boston, MA. 4/23/2006.

134. Carroll, M., E. Obillo, S.B. Symington and A. Shakarian. “Identification and characterization of lipase activity secreted by *Crithidia fasiculata* and *Crithidia lucilae*.” Rhode Island Network for Molecular Toxicology (RI-INBRE) Summer Undergraduate Research Program. University of Rhode Island, Kingston, RI. 8/17/2005.