MARY K. SALCEDO, Ph.D.
National Science Foundation Postdoctoral Fellow in Biology
Biomedical Engineering and Mechanics, Virginia Tech
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Biomechanist/Physiologist/Entomologist
insect flight, circulation and respiration, wing hydraulics, bioinspiration

I observe nature and animal movement through an engineering, ecological, and evolutionary perspective. With an in-depth background in entomology and insect systems, I focus my research program on what makes insect wings alive — examining active wing hydraulics during wing expansion, circulation patterns in the wing during, and what structures allow for and produce these flows. My future work investigates how environmental pressures influence wing function.

CURRENT POSITION

2019-Present **NSF Post-doctoral Fellow** **Virginia Tech**
Advisor: Dr. Jake Socha, Biomedical Engineering and Mechanics (BEAM)
- Studying insect wing expansion circulation, respiration, and mechanics of coupled flow systems
- Using synchrotron x-ray imaging at Argonne National Laboratory to capture novel information about insect physiology
- Collaborator with Global Locust Initiative at Arizona State U. to investigate wing expansion in the migratory locust, *Locusta migratoria*

EDUCATION AND TRAINING

2013-2019 **PhD, Organismic and Evolutionary Biology (OEB)** **Harvard University**
Advisors: L. Mahadevan, Harvard University, Professor of Applied Mathematics, Professor of OEB, and Professor of Physics
Stacey Combes, UC Davis, Professor of Neurobiology, Physiology, and Behavior
- Modeling of insect wing geometries across insect phylogeny
- Measurement of hemodynamics of circulation in insect wings
- Understanding role of hydraulics of wing expansion during metamorphosis

2012-2013 **Research Assistant at Concord Field Station** **Harvard University**

2007-2012 **Bachelor of Science (double major)** **Univ. of Washington**
Applied Computational Mathematical Science
Molecular/Cellular Biology

PEER-REVIEWED PUBLICATIONS & SUBMITTED MANUSCRIPTS

Salcedo, MK, Jun, B, Socha, JJ, Pierce, N, Vlachos, PP, Combes, SA. A living network: complex hemolymph circulation patterns in locust wings. *Submitted to Nature Communications* **(Nov 2021)**. Read on bioRxiv.

Salcedo, MK, *Ellis, TE, Sáenz, ÁS, *Lu, JL, *Worrell, T, Madigan, ML, Socha, JJ. Transient use of hemolymph for hydraulic wing expansion in cicadas. *Submitted to Current Biology* **(Oct 2021).**

Mikel-Stites, M, Salcedo MK, Socha, JJ, Marek, P, Staples, A. 3D-imaging inspired improvements to hearing model in parasitoid fly *Ormia ochracea*. *Submitted to PNAS Nexus* **(Oct 2021)**. Read on bioRxiv.

Salcedo, MK, Socha, JJ. Circulation in insect wings: a review on the necessity of hemodynamics in wing functionality. **Integrative and Comparative Biology (2020)**. doi: 10.1093/icb/icaa124

Burnett, N.P., King, E.E., Salcedo, M.K., Tanner, R.L. and Wilsterman, K. Conference scheduling undermines diversity efforts. **Nature Ecology & Evolution (2020)**, pp.1-2. doi:10.1038/s41559-020-1276-5

Salcedo, MK, Hoffmann, J, Donoughe, S, Mahadevan, L. Computational analysis of size, shape and structure of insect wings. **Biology Open (2019)**. doi:10.1242/bio.040774

Peleg, O, Peters, JM, Salcedo, MK, Mahadevan, L. Collective mechanical adaptation of honeybee swarms. **Nature Physics (2018)** 14(12): 1193. doi: 10.1038/s41567-018-0262-1

Hoffmann, J, Donoughe, S, Li, K, Salcedo, MK, Rycroft, CH. A simple developmental model recapitulates complex insect wing venation patterns. **PNAS. (2018)** 115(40): 9905 - 9910. doi: 10.1073/pnas.1721248115

Combes, SA, Salcedo, MK, Pandit, MM, Iwasaki, JM. Capture success and efficiency of dragonflies pursuing different types of prey. **Integrative and Comparative Biology (2013)** 53(5): 787 - 798. doi: 10.1093/icb/ict072

Williams, CD, Salcedo, MK, Irving, TC, Regnier, M, TL Daniel. The length–tension curve in muscle depends on lattice

spacing. **Proceedings of the Royal Society B. (2013)** Vol 280, issue 1776. doi: 10.1098/rspb.2013.0697
**undergraduate co-authors*

MANUSCRIPTS IN PREP

Salcedo, MK, Ellis, TE, Jones, T, Brun, PT, Socha, JJ. Fractal dimensions of wrinkly cicada wings throughout expansion. *Available upon request.*

Zhang, H, Salcedo, MK, Socha, JJ, Ryu, S. Wing circulatory patterns in dragonfly-inspired microfluidic devices. *Available upon request.*

FELLOWSHIPS

Date		Source/Institution
2019 - 2022	**NSF Postdoctoral Research Fellowship in Biology** Category: Broadening Participation (Current) [$207,000, 3 years]	**Nat. Sci. Foundation**
2021	**USDA-NIFA Postdoctoral Fellowship (Awarded)** Title: "Does toxin sequestration translate to pesticide resilience in Lepidoptera?" [$225,000, 2 years] - PI: Salcedo, Mentors: Dr. Sunghwan Jung (Biological and Environmental Engineering) and Dr. Anurag Agrawal (Entomology and Ecology/Evolution). Start date: July 1, 2022	**Cornell University**
2020	**Future Faculty Diversity Program Fellow** Leadership training and development of significant meaningful relationships with prospects, especially scholars traditionally underrepresented in their fields	**Virginia Tech**
2014 - 2017	**NSF Graduate Research Fellowship** Funded Ph.D. work [$125,000, 3 years]	**Nat. Sci. Foundation**

AWARDS

2021	**Society for Integrative and Comparative Biology (SICB), DEIJ Award** Inaugural awardee - Diversity, Equity, Inclusion, and Justice Award [$1000]	**SICB**
2017	**Travel Scholarship for Broadening Participation SICB** Travel to Annual Meeting [$500]	**SICB**
2016	**Distinction in Teaching** OEB 173: Comparative Biomechanics	**Harvard University**
2014	**Distinction in Teaching** Life Sciences 2: Evolutionary Human Physiology and Anatomy	**Harvard University**

GRANTS

2021	**The Company of Biologists' Travel Fellowship** To fund research trip to Global Locust Initiative at Arizona State (Cease Lab) [$3500]	
2021	**NSF REU Supplement** (to NSF Grant PHY 2014181) Title: "Incorporating fluid-filled veins in a bioinspired robotic insect flapper" [$27,000] - Designed and wrote proposal to support three undergraduate summer researchers. Role is mentor and lead experimentalist. Formal PIs of NSF grant: Anne Staples and Jake Socha	**Virginia Tech**
Jan 2020	**Beamtime allocation at Argonne National Laboratory (ANL)** "Generating and sensing forces in spider locomotion" General User Program (GUP) proposal #69127 (168 hours granted at beamline 32ID) - 3D synchrotron imaging of spider leg hydraulics[equivalent value of $42,000]	**Advan. Photon Source**
Nov 2019	**Beamtime allocation at ANL** "The mechanics of circulatory flows in insect wings - Part 2" GUP proposal #66434 (168 hours granted at beamline 2BM) - 3D synchrotron imaging inner insect wing vein geometries [equivalent value of $42,000]	**Advan. Photon Source**

INVITED PRESENTATIONS

Date	Seminar/Invited Talk	Institution
2022	Conference Symposium Speaker, "Open Technology," Jan 4th *Analyzing insect morphology: image analysis and 3D reconstruction using SlicerMorph*	**SICB**
2021	9th Ann. Hispanic/Latinx Invited Speaker, "Rising Strong", Oct 31	**Ent. Soc. America**

Where do I belong? Claiming your space, culture, and community in STEM

School of Life Sciences (SOLS) Seminar, Oct 15 **Arizona State U.**

Hydraulics of wing expansion in cicadas and locusts

Ecology and Evolution Seminar, Sept. 29th **Yale**

What makes a wing alive? Insect wing hydraulics and structures

Online high school teacher professional development, May 5 **Amgen Biotech Exp.**

Bringing your full self to STEM: accepting identity in the classroom

American Institute of Chemical Engineers (AIchE), May 5 **Corning Inc./AIchE**

Hydraulic design of micro-miniature heavy-lift vehicles: How do insects 'wing' it?

Ecology and Evolution Symposia, March 5 **U. Mass, Lowell**

Breathing bugs and flying snakes: the biomechanics of animals and their active fluid systems

Biological and Environmental Engineering, Feb. 19 **Cornell University**

Form, function, and flows of insect wings: applications in behavior and applied agriculture

Biology Seminar Series, Jan 29 **U. of Western Ontario**

What's inside an insect wing? Structure, flows, and function

2020-*all below* Environ-Lunch, Oct 29** **UC Merced**

Entomology Seminar, Oct 26** **Cornell University**

Biology Dept Seminar, Oct 5 **Virginia Tech**

Form and function of insect wing veins

Behavior, Ecology, and Physiology Seminar, June 3** **Bangor University**

Ecology and Evolution Seminar, April 20** **Wake Forest**

The STEM Village: Improving networks of LGBTQ+ scientists in Scotland, April 17*

What's in a wing? Venation pattern and hemolymph flows in insects

Link to talk: https://youtu.be/bSqFWZ4kcZQ -

Entomology Depart. Seminar, March 11 **UC Davis**

Hydraulics in an insect wing: how venation pattern affects circulation

Entomology Dept. Seminar, Jan 30* **Virginia Tech**

Conference Symposium Speaker, "Melding Math and Morphology" ***SICB***

What's in a vein? Using computational tools to explore wing diversity and functional consequences of venation patterns on hemodynamics

**updated versions of SICB 2020 presentation* ***updated version of research program*

CONFERENCE PRESENTATIONS (*denotes undergraduate mentee)

Salcedo, MK, Shevchenko, P, Socha, JJ. **Whole-wing microtomographic imaging of grasshopper wings**. Integr. Comp. Biol. (2021), virtual SICB. Talk. Link to talk: https://youtu.be/Tll5yNoX3kY

Salcedo, MK, Hoffmann, J, Donoughe, SD, Combes SA, Mahadevan L. **What's in a vein? Using computational tools to explore wing diversity and functional consequences of venation patterns on hemodynamics.** Integr. Comp. Biol (2020) SICB, Austin, TX. Symposium.

*Hardy, DJ, Salcedo, MK, Kenny, MC, Pulliam, JN, Pendar, H, Socha, JJ. **Shot through the heart: a non-invasive IR technique to measure dorsal heart pumping in insects.** Integr. Comp. Biol. (2020). Austin, TX. Poster.

Salcedo, MK, Combes, SA, Mahadevan L**. Active hemolymph flow in insect wings: characterization of uniform, bi-directional and pulsatile flow in a wing network.** Integr. Comp. Biol. (2018) Vol. 58, pp. E196. SICB, San Francisco, CA. Talk.

Salcedo, MK, Hoffmann, J, Mahadevan, L. **Wing vein topology and the hydraulics of wing expansion.** OEB G4 Symposium. Cambridge, MA. **(**26 - 27 April 2017). Talk.

Salcedo, MK, Combes, SA, Mahadevan L. **Wing vein networks across insect orders: examining hierarchical network structure and hemolymph flow.** Integr. Comp. Biol. (2017) SICB, New Orleans, LA. Talk.

Salcedo, MK, Combes, SA, Mahadevan L. **Wing expansion in dragonflies and field crickets: a tightly folded solution to a complex behavior.** Integr. Comp. Biol. (2016) Vol. 56, pp. E250. SICB, Portland, OR. Talk.

Combes, SA, Salcedo MK, Gagliardi, SF, Crall, JD, Iwasaki, JM, Rundle, DE. **Optimal flight speeds during dragonfly predator-prey encounters.** Integr. Comp. Biol. (2015) Vol. 55, pp. E33. SICB, West Palm Beach, FL. Poster.

RESEARCH EXPERIENCE

Date	Position	Institution

July 2019 -Present	**Postdoctoral Researcher**
	PI: Jake Socha
	- Quantifying tracheae expansion/collapse and relationship to hemolymph movement
	- Use of Advanced Photon Source (Argonne National Laboratory, Lemont, IL) to visualize complex internal physiology of insect wings and wing pads
	- Use of Matlab/Python to analyze ultrasound recordings of dorsal heart movement in beetles
	- Use of free-ware Slicermorph to reconstruct insect morphology in 3D
	- On-going collaborations
	  - Particle image velocimetry expert, Dr. Pavlos Vlachos (Purdue) to track fluorescent particles throughout the insect body
	  - Dr. Sangjin Ryu (Nebraska), to investigate flow patterns in dragonfly-inspired microfluidic device. Gained skills on confocal to measure flow in dragonfly wings
	  - Global Locust Initiative with Dr. Arianne Cease (Arizona State) to measure wing expansion in locusts under crowded and solitary conditions.
	  - Dr. Pierre Thomas Brun (Princeton) to measure wrinkle movement in expanding cicada wings
	  - Dr. Jessica Ware (AMNH) and graduate student Sallqa-Tuwa Bondoc Mafla to create pipeline for 3D reconstruction of insect morphology
		Virginia Tech

2013-2019	**Graduate Researcher** PI: Stacey Combes and L. Mahadevan - Comparative geometric analysis of insects wings based on size, shape, and topologies of wing networks - Biomechanical analysis of hemodynamics in wings of the North American Grasshopper - Quantified auto-expansion of insect wings during metamorphosis - Determined swarm dynamics of honeybees and collective motion under wind-like mechanical motion	**Harvard University**
Aug. 2012 -2013	**Research Assistant, Concord Field Station** PI: Stacey Combes - Field experience: catching insects, rearing nymphs to adults, monitoring dragonfly populations - Work on tracking wing bending kinematics and biological modeling through high speed video - Managed lab: ordering supplies, maintaining equipment, organizing lab environment	**Harvard University**
2010-2012	**Undergraduate Research Assistant** PI: Tom Daniel - Supported graduate research into study of biomechanics and muscle physiology - Modeled data with Python/Matlab, built experimental rig for muscle physiology and computational analysis of x-ray diffraction images - Organized, managed and assisted in conducting of a cross-disciplinary and collaborative x-ray diffraction experiment at Beamline 18-ID, Advanced Photon Source, Argonne National Laboratory, Illinois (August 2011) - Built, placed and measured electrodes in steering and flight muscles of *Manduca sexta* - Experience with high speed cameras and digital tracking	**Univ. of Washington**
2009 - 2010	**Undergraduate Research Assistant** PI: Pat Stayton - Supported post-doctoral research into the study of water interactions with streptavidin protein - Performed protein expression on eight mutant strains of DNA - Experimental skills included: design of DNA sequences, growth of cells and insertion of DNA, gel analysis, cell lysis techniques and biotin immunoprecipitation	**Univ. of Washington**

TEACHING EXPERIENCE

Date	Position	Institution
Apr 2021	**Guest Lecturer,** Bioinspiration, April 13	**U. Michigan**
Nov 2020	**Guest Lecturer,** E&EB 295: Life in Motion: Eco. & Evo. Phys, Nov 16	**Yale University**
Oct 2020	**Guest Lecturer,** BIOL 472: Form and Function Lab, Oct 5	**Towson University**

Aug 2020	**Guest Lecturer,** Biology Dept, Asynchronous Learning Workshop, Aug 4	**Virginia Tech**
July 2020	**Guest Lecturer,** Biology Dept, "Anti-racism education in biology," July 7	**Virginia Tech**
June 2020	**Faculty for Cornell Summer Pre-College Program***	**Cornell University**

UNIV-1110: Building intuition: Bioinspiration and foundations of design in biological systems
Co-faculty: Dr. Jacob Peters (Electrical and Computer Engineering, Cornell University)

- Designed, created, and led course new course to examine how engineers are inspired from biological systems, and how they build off those principles. We reviewed published bio-inspired technologies, lectured on foundational mathematical principles, and interviewed scientists behind the work.
- Lectures can be viewed: http://bit.ly/foundationsOfBioinspiration

Feb 2020	**Guest Lecturer**, ESM 4106: Engineering Analysis of Physiologic Systems	**Virginia Tech**

- Gave lecture on hemolymph circulation mechanisms in insects and their appendages

Fall 2019	**Guest Lecturer**, ENT 5114: Insect Structure and Function	**Virginia Tech**

- Gave lectures on insect appendages, appendage function, insect wings, and wing-joining mechanisms

June 2017 & June 2018	**Faculty for Harvard Summer Pre-College Program**	**Harvard University**

BIOS P-13540: Comparative Biomechanics and Physiology: Designing Insect-Inspired Gliders

- Designed and led course new course combining insect physiology, entomology and biomechanics with a focus on insect-inspired glider design. Strong focus on combining applied math/biological principles.
- Students toured entomology collections, were led in insect dissections, learned to catch insects outdoors, make gliders based on biological observations, then mechanically test said gliders in wind tunnels and with an Instron.

Spring 2016	**Teaching Fellow,** OEB 173: Comparative Biomechanics	**Harvard University**
Fall 2014	**Teaching Fellow,** LS2: Evolution and Human Physiology and Anatomy	**Harvard University**
Fall 2014	**Teaching Fellow,** LS2: Evolution and Human Physiology and Anatomy	**Harvard Ext. School**
Sept 2010	**Teaching Assistant,** Engineering Bridge Program	**Univ. of Washington**
Summer 2010	**Teaching Assistant,** Initiative for Maximizing Student Diversity	**Univ. of Washington**

DIVERSITY, INCLUSION, AND OUTREACH EXPERIENCE

Year	Position	Institution/Org
May 2021	**Invited Speaker, High school Teacher Professional Development Workshop**	**LSO/ABE**

LSO - LabXchange Science Outreach (Harvard), ABE - Amgen Biotech Experience Massachusetts

- Led conversation with group of teachers in virtual professional development
- Conversation on SACNAS, identity, anti-racism in the classroom

Jan 2021	**Accessibility Creator for virtual SICB 2021**	**SICB**

Initiated efforts to create caption guidelines for virtual conference

- Created guidelines for captioning science presentations for national conference
- Enabled 67% of SICB members to caption talks to allow disabled scientists to attend

Jan 2020 -Present	**Member, SACNAS Membership Committee**	**SACNAS**

Society for the Advancement of Chicanos/Hispanics and Native Americans in Science
Member serving on sub-committee of national SACNAS organization

- Focuses on retaining members and providing professional development resources

Nov 2019 -Jan 2021	**Member, BEAM Inclusion and Diversity Committee**	**Virginia Tech**

Member identifying key inclusion/diversity issues

- Devises solutions, takes active role in recruiting underrepresented students, leads workshops

2019 & 2020	**Lead Volunteer for Socha Lab booth at Hokie BugFest**	**Virginia Tech**

- Organized and created content for virtual "Socha Insect Story and Crafts Corner" with stories in Spanish/English, cooking and painting crafts (2020)
- Designed vertical wind tunnel to "fly" fake plastic insects with variety of wing aspect ratios (2019)

Oct 2015 -May 2019	**Lead Recruiter and Co-Vice President of SACNAS at Harvard**	**Harvard University**

Co-Vice President of SACNAS at Harvard Chapter (2016 - 2019)
Lead Recruiter for Harvard OEB Dept. (2015 - 2019)

- Organized departmental diversity initiatives based around the SACNAS conference
- Met with other dept./school heads to organize and determine top priorities at conference

- Encouraged students with diverse backgrounds to apply to Harvard and other graduate programs
- Created and designed unique professional development workshops for URM students at Harvard

2020-Present **LGBTQIA+ Mentor at SICB** **SICB**
- Supported and encouraged attendees who identify as LGBTQIA+ at SICB

2017-Present **Broadening Participation Mentor at SICB** **SICB**
- Supported URM undergraduate attendees at SICB

2015-2016 **Volunteer, local New England High Schools**
- Taught lessons by request via GradWagon (online science-connect platform)
- Focused on entomology, insect collection, insect preservation, local pollinators, insect dissections

Manchester High School Central, NH (April 2016)
Belfast Area High School, ME — visiting Cambridge, MA (March 2016)
Urban Science Academy, MA (Jan 2016)
Shore Educational Collaborative/Henry Owen School, MA (May 2015)
Westborough High School, MA (Nov. 2015)

Aug 2015 **Program manager of professional development workshop** **Concord Field Station**
Concord Field Station Teacher Professional Development with LSO/ABE
- Coordinated with Harvard's Life Sciences Outreach Program for 2-day workshop
- Developed workshop to teach local high school teachers field-based lessons for their classroom
- Cross-disciplinary work with graduate students and post-docs to design lesson plans
- Designed hands-on labs for teachers to participate in, critique, and edit for their classrooms
- Introduced a bee-keeping course component which many teachers implemented in their own classroom

2014-2017 **Volunteer with Harvard Museum of Natural History** **Harvard University**
- ArtsFirst Festival, Build-a-Bug (April 2017)
- I Heart Science (Feb. 2016-2019)
- Insect outreach "All about honeybees" (June 2015)
- Museum storytime (Nov 2014)

MENTORING DOCUMENTS

Salcedo, MK. Undergraduate Expectations Document - working with Dr. Salcedo. doi:10.5281/zenodo.4000437

MENTORING EXPERIENCE

Oct 2022-Present **Wing expansion with Global Locust Initiative** **Arizona State**
- Mentored and trained 25 undergrads, 5 grads to observe and measure wing expansion in plague locusts through collaboration with Cease Lab at ASU
- Goal is to bring students as co-authors on project as data is analyzed

Mar 2021-Sept 2021 **Team of undergraduates in Field Research and Publication** **Virginia Tech**
- Brought team of 9 undergrads to Washington D.C. to observe Brood X cicada emergence
- Trained on insect collection, handling, and physiological measurements
- Invited all undergraduates (3 continued on) to participate in analysis and manuscript prep

Mar 2021-Present **Tyler Ellis, Engineer** **NAVSEA**
- Recent VT undergrad working on measurements of insect wings throughout emergence
- Training in image analysis, Matlab coding, figure-making, and manuscript publication

Mar 2021-Present **Joyce Lu, Undergraduate** **Virginia Tech**
- Training in image analysis, Matlab coding, figure-making, and manuscript publication

Mar 2021-Sept 2021 **Afreen Khoja, Undergraduate (REU)** **Virginia Tech**
- Mentored through design of novel insect-wing inspired robotic flapper
- Training in foundations of biological design and experimental methods in biomechanics

July 2019-Present **Donovan Hardy, Undergraduate (REU)** **Morehouse College**
- Led in design of infrared device that detects dorsal vessel pumping in insects
- Supported and mentored at national STEM conference
- Helped pursue research positions, facilitated connections to neuroengineering labs

Sept 2020-Present **Terrell Worrell, Undergraduate** **Virginia Tech**

- Training in decoding behavior of dragonfly take-off maneuvers
- Training in reconstruction of flight kinematics, image analysis, Matlab coding, figure-making, and manuscript publication

Sept 2020-Mar 2021 **Mohamed Hussein, Undergraduate** **Virginia Tech**
- Training in microCT image processing, 3D reconstruction, and 3D printing

Nov 2019-Nov 2020 **Yulia Kirina, Undergraduate** **Virginia Tech**
- Training in insect animal care and rearing
- Teaching image preprocessing, segmentation and analysis of microCT data

Nov 2019-Dec 2020 **Zaid Salameh, Undergraduate** **Virginia Tech**
- Teaching image preprocessing, segmentation and analysis of microCT data
- Career guidance towards graduate school and STEM career planning

Summer 2016 **Johanna Lara, High School Senior** **Masconomet High**
- Led in field- and collection-based entomological research at the Concord Field Station

Summer 2016 **Connor Mochi, High School Senior** **Masconomet High**
- Led in field- and collection-based entomological research at the Concord Field Station

PRESS

Greenfieldboyce, Nell, "Brood X Cicadas Are Busy And So Are The Scientists Who Study Them." NPR: All Things Considered. **25 May 2021**. https://n.pr/3hB2DHi

Garvey, Kathy Keatley. "Seminar on March 11: Mary Salcedo and Insect Wings." Entomology & Nematology News: UC News about Entomology and Nematology. **10 March 2020.** https://bit.ly/3cAe7qO

Canon, William. "Flying Right." Harvard Gazette. **29 May 2019.** https://bit.ly/3kVeSxC

Salcedo, MK. "First person — Mary Salcedo." Biology Open First Person Series. **18 October 2019**. https://bit.ly/339wmQP

EDITORIAL AND REFEREE SERVICE

Journal of Theoretical Biology, Integrative and Comparative Biology, Journal of Material Science, Nature Communications, PLOS Computational Biology

PROFESSIONAL ASSOCIATIONS

Jan 2020-Present Committee Member, SACNAS Membership Committee
Oct 2011-Present Member, Society for Integrative and Comparative Biology (SICB)
Oct 2015-Present Member, SACNAS
2016-2019 Co-Vice President , SACNAS at Harvard Chapter