

# SHELLY A. TRIGG, Ph.D.

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University of Washington School of Aquatic and Fishery Sciences, 1122 NE Boat Street Room 234, Seattle, WA 98105

## SUMMARY OF QUALIFICATIONS

- Systems Biologist/Genomicist with 10+ years of experience and an established record of scientific contribution to the fields of plant and marine animal genomics
- Experienced in developing and optimizing innovative assays using a broad range of approach and techniques to elucidate molecular pathways underlying organism health
- Experienced in written and oral communication to various audiences through technical reports, peer reviewed scientific journal articles, public presentations, and community outreach
- Demonstrated abilities to collaborate and take leadership through team and project management, and volunteer activities with government agencies, tribal organizations, commercial fisheries, and non-profit institutions

## EXPERIENCE

### University of Washington School of Aquatic and Fishery Sciences, Seattle, WA

Postdoctoral Research Associate.....Sept 2018 - Present

Advisor: Steven Roberts, Ph.D.

- Assess epigenetic variation and identify epigenetic marks that differ within Atlantic salmon and Pacific geoduck clam populations exposed to different environmental conditions through analyzing and interpreting genome-wide methylation bisulfite sequencing data
- Develop a qPCR assay to assess reproductive development of Pacific geoduck exposed to different seawater pH using non-lethal, temporally-collected hemolymph samples
- Identify and interpret temporal proteome variation in metamorphosing Pacific oysters exposed to different temperatures
- Assess resilience in pteropods to low oxygen and pH conditions through survival, development, and metabolomics analysis
- Lead cooperative field, hatchery, and laboratory research in collaboration with Jamestown-S'klallam Tribe Fisheries Division, Taylor Shellfish Hatchery, and NOAA NWFSC Conservation Biology Division

### NOAA Northwest Fisheries Science Center, Conservation Biology, Seattle, WA

NSF Graduate Research Internship Program Fellow.....Jun 2017 - May 2018

Advisors: Krista Nichols Ph.D. and Paul McElhany Ph.D.

- Assess physiological impacts of ocean acidification on Dungeness crabs through metabolomics analysis
- Develop and implement bioinformatics pipelines for analyzing complex metabolomics data sets from differentially conditioned Dungeness crabs
- Carried out time-course high throughput laboratory ocean acidification exposure experiments on Dungeness crab larvae
- Did field collection and laboratory rearing of Dungeness crab larvae, juveniles and adults

### Salk Institute for Biological Studies, Ecker Lab, Genomic Analysis Section, La Jolla, CA

Graduate Student Researcher .....Aug 2013 - Sept 2018

Research Assistant II .....Jul 2012 - Aug 2013

Research Assistant I .....Nov 2011 - Jun 2012

Ph.D. dissertation: High-resolution molecular networks from novel 'omics' approaches elucidate survival strategies in organisms from land to sea

Advisor: Joseph Ecker, Ph.D.

- Developed a DNA sequencing assay (CrY2H-seq) for high throughput protein-protein interaction mapping and coded a bioinformatics analysis pipeline to identify and quantify interactions from large sequence datasets
- Performed network simulations for observed network validation
- Generated model predictions to evaluate assay performance

- Performed quality control, network analysis, data integration, and functional analysis to interpret biological significance of protein interaction networks
- Generated comprehensive protein-protein interactome map for Arabidopsis thaliana using CrY2H-seq to iteratively screen billions of interactions en masse
- Did high throughput engineering of thousands of expression clones

### **Dana Farber Cancer Institute, Center for Cancer Systems Biology, Vidal Lab, Boston, MA**

Research Technician I .....Aug 2010 - Oct 2011

Research Trainee .....Jan 2010 - Aug 2010

- Generated comprehensive human protein-protein interactome map from high throughput yeast two-hybrid screening, protein complementation assay, and well-nucleic-acid-programmable-protein-array assay
- Developed a high throughput well-nucleic-acid-programmable-protein-array validation assay
- Generated protein-protein interactome map from high throughput yeast two-hybrid screening of autism genes and isoforms against a human ORFeome
- Constructed clone collections of Kaposi's Sarcoma and Epstein-Barr viral genes by high throughput gateway cloning for yeast two-hybrid screening against a human ORFeome to further define potential cancer driver and passenger proteins

### **Simmons College, Department of Chemistry, Roecklein-Canfield Lab, Boston, MA**

Undergraduate Researcher.....July 2009 - June 2010

B.S. Honors Thesis: The effectiveness of the GST fusion system for isolating Epstein-Barr viral thymidine kinase, a potential target for antiviral antitumor therapies.

- Developed and optimized a GST immunoprecipitation assay for isolation of Epstein-Barr viral proteins

## **EDUCATION**

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Ph.D. in Biological Sciences.....Sept 2018

University of California San Diego, La Jolla, CA

B.S. in Biochemistry.....May 2010

Magna Cum Laude and honors thesis, Simmons College, Boston, MA

## **TECHNICAL SKILLS AND TRAINING**

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**Molecular and Cellular Biology:** Illumina and Oxford Nanopore DNA sequencing, whole genome, RNAseq and Bisulfite sequencing library preparation, PCR, qPCR, oligo design, ELISA, immuno-blotting and precipitation, recombinant DNA techniques, nucleic acid and protein purification, cell culture and transfection, histological techniques

**Marine Biology:** respirometry measurement with PreSens equipment, animal rearing systems design, construction and implementation, seawater chemistry analysis

**Laboratory Automation:** Tecan liquid handling robots and plate readers

**Computation:** Genomics, epigenomics, proteomics, and metabolomics data analysis, data reduction and integration, molecular network analysis (Cytoscape, Qiagen IPA), Linux environment familiarity, Bash and Python/Jupyter scripting, R, data management, supercomputing, GitHub (<https://github.com/shellytrigg>), Slack, Google Suite applications, Microsoft Office applications

**Training:** LC-MS Data processing and statistics course, UC Davis (Jan 2018); Visiting Scientist Network Analysis Training Program, Broad Institute (Jan-Feb 2016); NSF Graduate Data Science Workshop, University of Washington (Aug 2015); Biostatistics Refresher Course, UC San Diego (Aug 2015); Software Carpentry, Salk Institute (Jun 2013, Jan 2014); Tecan EVO Training Course (Aug 2012)

## LEADERSHIP ACTIVITIES

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### Management:

- Trained, supervised, and managed 4 research assistants, 2 technicians, and 8 students from various backgrounds
- Mentored 2 graduate students at UC San Diego, 2 undergraduate and 3 graduate students at University of Washington, and 1 undergraduate student at NOAA NW Fishery Science Center

### Committees:

- Postdoctoral representative of UW SAFS Communications Committee, 2018 - present
- Chair of UC San Diego Biology Department Peer Mentoring Committee, 2015-2016
- Chair of UC San Diego Quantitative Biology graduate seminar series, 2015-2016
- Member of the Salk Institute Partnerships in Science committee 2014-2016
- Member of UC San Diego STEM Education and Diversity group 2014-2016
- Member of Association of Women in Science San Diego Outreach Committee, 2012-2016

## PUBLICATIONS

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Shelly A. Trigg, P McElhany, M Maher, D Perez, DS Busch, and KM Nichols. (2019) Uncovering mechanisms of global ocean change effects on Dungeness crab (*Cancer magister*) through metabolomics analysis. ***Scientific Reports***. <https://doi.org/10.1101/574798>.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, SC Huang, ZZ Zhang, M Galli, and JR Ecker (2017) CrY2H-seq: a massively multiplexed assay for deep coverage interactome mapping. ***Nature Methods***. 14(8):819-825.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, SC Huang, ZZ Zhang, M Galli, and JR Ecker (2017) CrY2H-seq interactome screening. ***Protocol Exchange***. doi:10.1038/protex.2017.058.

X Yang, [15 others], Shelly A. Trigg, [20 others], and M Vidal. (2016) Widespread expansion of protein interaction capabilities by alternative splicing. ***Cell***. 164(4):805-817.

T Rolland, [53 others], Shelly A. Trigg, [14 others], and M Vidal. (2014) A proteome-scale map of the human interactome network. ***Cell***. 159(5):1212-1226.

R Corominas, [8 others], Shelly A. Trigg, [18 others], M Vidal, and LM Iakoucheva. (2014) Protein interaction network of alternatively spliced isoforms from brain links genetic risk factors for autism. ***Nature communications***. 5:3650.

Rozenblatt-Rosen, [36 others], Shelly Wanamaker, [13 others], and M Vidal. (2012) Interpreting cancer genomes using systematic host network perturbations by tumour virus proteins. ***Nature***. 487(7408):491-495.

## MANUSCRIPTS IN PREPARATION/REVIEW

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Shelly A. Trigg, KM Mitchell, R Elliot, B Eudeline, B Vadopalas, EB Timmins-Schiffman, SB Roberts. (2020) Temporal proteomic profiling reveals insight into critical developmental processes and temperature-influenced physiological response differences in a bivalve mollusc. <https://doi.org/10.1101/2020.06.05.137059>. (*In review, BMC Genomics*)

Shelly A. Trigg, G Nunez-Acuna, V Valenzuela-Munoz, D Valenzuela-Miranda, C Gallardo-Escárate, and SB Roberts. (2020) Epigenomic and transcriptomic relationships in Atlantic salmon infested with sea lice under a changing environment. (*In preparation*)

Shelly A. Trigg, DS Busch, P McElhany, M Maher, D Perez, C O'Brien, and KM Nichols. (2020) Searching for signs of resilience in over-wintering juvenile pteropods to ocean acidification and deoxygenation. (*In preparation*)

HM Putnam, Shelly A. Trigg, SJ White, LH Spencer, B Vadopalas, A Natarajan, J Hetzel, E Jaeger, J Soohoo, C Gallardo-Escárate, FW Goetz, and SB Roberts. (2020) Environmental memory through dynamic DNA methylation provides acclimatization of geoduck clams to ocean acidification. (*In preparation*)

BC Willige, M Zander, A Phan, RM Garza, Shelly A. Trigg, Y He, JR Nery, H Chen, JR Ecker, and J Chory. (2020) PHYTOCHROME INTERACTING FACTORs trigger environmentally responsive chromatin dynamics. bioRxiv <https://doi.org/10.1101/826842>. (*In review*, **Nature Genetics**)

ET Montañó, [32 others], Shelly A. Trigg, K Pogliano, and J Pogliano. (2020) Isolation and Characterization of Streptomyces Bacteriophages and the Biosynthetic Arsenals of their Associated Hosts. (*In review*, **PLoS One**).

## CONFERENCE PRESENTATIONS

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Shelly A. Trigg. (Apr 2020) Searching for signs of resilience in over-wintering juvenile pteropods to ocean acidification and deoxygenation. NOAA Northwest Fisheries Science Center Science Symposium 2020, talk. <https://doi.org/10.6084/m9.figshare.12440192.v1>

Shelly A. Trigg. (Jan 2020) Influence of ocean acidification on DNA methylation patterns in geoduck clams. Plant and Animal Genome Conference XXVIII, San Diego, CA, talk. <https://github.com/shellytrigg/talk-pag2020>. **Recipient of PAG XXVIII USDA NRSP8 Aquaculture Travel Grant.**

Shelly A. Trigg. (Nov 2019) Environmental influence on the Atlantic salmon epigenome during sea lice infestation. International Conference on Integrative Salmonid Biology, Edinburgh, UK, talk. <https://doi.org/10.6084/m9.figshare.10882775.v1>. **Recipient of University of Washington College of the Environment Travel Award.**

Shelly A. Trigg. (Sept 2019) A protein inventory reveals mechanisms of temperature impact on oyster development. Pacific Coast Shellfish Growers Association 2019 Conference, Portland, OR, talk. <https://doi.org/10.6084/m9.figshare.11839359.v1>

Shelly A. Trigg, P McElhany, M Maher, D Perez, DS Busch, and KM Nichols. (May 2019) What happens to Dungeness crab in high CO<sub>2</sub>: experiments and questions. 2019 WOAC Ocean Acidification Science Symposium, Seattle, WA, talk and poster. **Invited speaker.**

Shelly A. Trigg, KM Mitchell, R Elliot, B Vadopalas, EB Timmins-Schiffman, SB Roberts. (Apr 2019) Temperature-influenced protein network differences in the Pacific oyster (*Crassostrea gigas*) during larval development. Bevan Series Symposium and SAFS Centennial, Seattle, WA, poster.

Shelly A. Trigg, P McElhany, M Maher, D Perez, DS Busch, and KM Nichols. (Mar 2019) Effects of ocean acidification on Dungeness crab. NOAA Mukilteo Open House, Mukilteo, WA, poster.

Shelly A. Trigg, KM Mitchell, R Elliot, B Vadopalas, EB Timmins-Schiffman, SB Roberts. (Mar 2019) Temperature-influenced protein network differences in the Pacific oyster (*Crassostrea gigas*) during larval development. Network Biology Meeting, Cold Spring Harbor Labs, Cold Spring Harbor, NY, poster.

Shelly A. Trigg. (Oct 2018) Be a claw abiding citizen: learn how ocean acidification can affect Dungeness crab. National Marine Sanctuaries Webinar Series, webinar. <https://sanctuaries.noaa.gov/education/teachers/be-a-claw-abiding-citizen.html>. **Invited speaker.**

Shelly A. Trigg, P McElhany, M Maher, D Perez, DS Busch, and KM Nichols. (Mar 2018) Uncovering mechanisms of global ocean change effects on Dungeness crab through metabolomics analysis. NOAA NWFSC 6<sup>th</sup> Science Symposium, Seattle, WA, talk.

Shelly A. Trigg, P McElhany, M Maher, D Perez, DS Busch, and KM Nichols. (Feb 2018) Uncovering mechanisms of global ocean change effects on Dungeness crab through metabolomics analysis. Ocean Sciences Meeting, Portland, OR, poster.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, ZZ Zhang, M Galli, and JR Ecker (Sept 2016) ProCREate: A New Assay for Generation of

Large-Scale Protein-Protein Interaction Maps, HHMI Scientific Meeting, Janelia Research Campus, Ashburn, VA, poster.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, ZZ Zhang, M Galli, and JR Ecker (Sept 2016) ProCREate: A New Assay for Generation of Large-Scale Protein-Protein Interaction Maps, UCSD Biology annual retreat, Lake Arrowhead, CA, poster.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, ZZ Zhang, M Galli, and JR Ecker (Mar 2016) Next-Generation Protein Interactomes for Plant Systems Biology and Biomass Feedstocks Research, USDA-DOE Plant Feedstock Genomics for Bioenergy Meeting, Tyson's Corner, VA, poster.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, ZZ Zhang, M Galli, and JR Ecker (October 2015) The ProCREate interactome mapping technique reveals crosstalk and directionality between Arabidopsis regulatory networks, Salk Science at the Seaside, La Jolla, CA, poster and mini presentation. **People's Choice Award for best mini presentation.**

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, ZZ Zhang, M Galli, and JR Ecker (Sept 2015) ProCREate: A New Assay for Generation of Large-Scale Protein-Protein Interaction Maps, UCSD Biology annual retreat, Lake Arrowhead, CA, poster.

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, M Galli, and JR Ecker (Aug 2015) Finding biological relevance in large-scale protein network studies, NSF Data Science Workshop, Seattle, WA, poster. **Selected presenter.**

Shelly A. Trigg, RM Garza, A MacWilliams, JR Nery, J Reyna, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, CS Huang, M Galli, and JR Ecker (Feb 2015) Next-Generation Protein Interactomes for Plant Systems Biology and Biomass Feedstocks Research, USDA-DOE Plant Feedstock Genomics for Bioenergy Meeting, Tyson's Corner, VA, poster.

Shelly A. Trigg, A MacWilliams, JR Nery, A Bartlett, R Castanon, A Goubil, J Feeney, R O'Malley, M Galli, and JR Ecker (Feb 2014) Next-Generation Protein Interactomes for Plant Systems Biology and Biomass Feedstocks Research, USDA-DOE Plant Feedstock Genomics for Bioenergy Meeting, Arlington, VA, poster.

Shelly A. Trigg, J Feeney, JR Nery, A Bartlett, R Castanon, A Goubil, R O'Malley, M Galli, and JR Ecker (Feb 2013) Next-Generation Protein Interactomes for Plant Systems Biology and Biomass Feedstocks Research, USDA-DOE Plant Feedstock Genomics for Bioenergy Meeting, Bethesda, MD, poster.

## **GRANTS, FELLOWSHIPS, AND AWARDS**

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USDA NRSP8 Small Funding Award (\$10K)	2020
USDA NRSP8 PAGXXVIII Aquaculture Travel Award (\$1K)	2020
UW Data Science Postdoctoral Fellowship (\$7K)	2019 - present
UW College of the Environment Travel Award (\$1K)	2019
NSF GRIP Fellowship with NOAA Northwest Fisheries Science Center (\$5K)	2017- 2018
NSF Graduate Research Fellowship (\$138K)	2014-2018
NSF PAMP EAGER: Using novel, clone-free sequencing methods to discover host-microbe protein-protein interactions (Co-authors: Shelly Trigg, Paulo Teixeira, Jeff Dangel (CO-PI), and Joseph Ecker (CO-PI); \$300K)	2016
Excellence in Teaching Award, UC San Diego Division of Biological Sciences	2016
Salk Science at the Seaside Annual Retreat Minute-to-win-it poster presentation People's Choice Award	2015
Rookie of the Year Award for being a new Association of Women In Science chapter member who demonstrated a commitment to advancing the goals of the organization by volunteering efforts, providing ideas, and promoting the organization outside of AWIS	2013
Allen Douglass Bliss Award in Chemistry for academic achievement and promise in the field	2010

## TEACHING EXPERIENCE AND COURSEWORK

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Co-teacher, Integrative Environmental Physiology, University of Washington	03/2020-06/2020
Co-teacher, Bioinformatics for Environmental Sciences. University of Washington	09/2020-12/2020
Evidence-Based Teaching and Learning in Biological Sciences course, UC San Diego	01/2017-03/2017
Head Instructional Assistant, Regulation of Eukaryotic Gene Expression, UC San Diego	01/2017-03/2017
Introduction to College Biology Education course, UC San Diego	03/2016-06/2016
Instructional Assistant, Genomics Research Initiative Lab, UC San Diego	03/2016-06/2016
Student Instructor, Quantitative Biology graduate seminar, UC San Diego	09/2015-08/2016
Instructional Assistant, Biochemical Techniques Lab, UC San Diego	09/2014-12/2014
Teaching Assistant, Biochemistry II, Simmons College	01/2010-05/2010
Teaching Assistant, Organic Chemistry I, Simmons College	01/2009-05/2009
Teaching Assistant, Organic Chemistry II, Simmons College	09/2008-12/2008
Teaching Assistant, General Chemistry, Simmons College	01/2008-04/2010

## EDUCATION OUTREACH

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### Events:

Salish Sea Expeditions Training workshop presenter	2020
UW SAFS Open House shellfish and ocean acidification presenter	2019
National Marine Sanctuaries ocean acidification multimedia toolkit development	2017-2018
Salk Institute Education Outreach plant biology video media development	2016
Salk Institute AAAS New Frontiers in Science Education curriculum developer	2014-2017
UC San Diego Undergraduate Biology Showcase poster judge	2015-2016
Reuben H. Fleet Science Center #2Scientists program	2014-2016
Expanding Your Horizons San Diego AWIS presenter	2013-2015
AWIS San Diego undergraduate career panel coordinator	09/2014
Albert Einstein Academy Family Science Night presenter	04/2014
ACS Chemistry Expo AWIS presenter, San Diego	10/2013
Greater San Diego Science Festival Expo Day presenter	2013-2014
Greater San Diego Science Festival poster judge	2013-2014

### Products:

NOAA Fisheries ([Shelly A. Trigg](#)) (2019) Dungeness Crabs in Changing Waters: Research on Ocean Acidification. Video short. <https://videos.fisheries.noaa.gov/detail/videos/west-coastregional/video/6029222940001/dungeness-crabs-in-changing-waters:-research-on-oceanacidification>

West Coast National Marine Sanctuaries Education Team and NOAA Northwest Fisheries Science Center ([Shelly A. Trigg](#)) (2018) Ocean acidification communication toolkit: Dungeness crab case study. <https://sanctuaries.noaa.gov/education/crab-toolkit.html>.

Salk Institute for Biological Studies ([Shelly A. Trigg](#)) (2016) Meet Salk Plant Biology 2016. Video lab tour. <https://www.youtube.com/watch?v=9HdoPcgRO4w&feature=youtu.be>

Salk Institute for Biological Studies ([Shelly A. Trigg](#)) (2016) New Frontiers in Science Education. Video curriculum. <https://www.youtube.com/watch?v=Lb6xvHVhpwQ&feature=youtu.be>