

David C H Metzger

CURRENT APPOINTMENT

2023 – present **Research Associate**, Zoology Department, The University of British Columbia.
Visiting Research Scientist, Department of Fisheries and Oceans Canada,
Vancouver, BC.

EDUCATION

- 2018 – 2023 **Postdoctoral Research Fellow**, Biodiversity Research Centre, The University of British Columbia, Vancouver, BC.
- 2012 – 2018 **PhD Zoology**, The University of British Columbia, Vancouver, BC.
Thesis: Environmental epigenomics in stickleback: DNA methylation and gene expression plasticity across time scales.
Advisor: Dr. Patricia Schulte.
- 2010 – 2012 **MSc Aquatic and Fishery Sciences**, University of Washington, Seattle, WA.
Thesis: Characterizing the effects of ocean acidification in larval and juvenile Manila clam, *Ruditapes philippinarum*, using a transcriptomic approach.
Advisor: Dr. Steven Roberts.
- 2001 – 2005 **BA Biology (cum laude)**, Ithaca College, Ithaca, NY.

PUBLICATIONS (*h*-index = 14)

Preprint – in review

- (24) **Metzger DCH** (2023) Responses and adaptations to the environment: epigenetic mechanisms in response to environmental change. *Encyclopedia of Fish Physiology, Second Edition*.
(Submitted)
- (23) **Metzger DCH**, Porter I, Sandkam BA, Fong LJM, Mank JE (2022) Transposon wave remodeled the epigenomic landscape in the rapid evolution of a novel X chromosome dosage compensation mechanism. *bioRxiv*.
<https://biorxiv.org/cgi/content/short/2022.09.29.510218v1>
(in review at *Genome Research*)
- (22) **Metzger DCH & Mank JE** (2020) Conserved sex-biased DNA methylation patterns target key developmental genes and non-recombining region of the guppy sex chromosome. *bioRxiv*. <https://doi.org/10.1101/2020.08.21.261792>

Published manuscripts

- (21) Fong LJM, Darolti I, **Metzger DCH**, Morris J, Lin Y, Sandkam BA, Mank JE (2023) Parsimony and poeciliid sex chromosome evolution. *Genome Biology and Evolution*, 15(9), evad128. <https://doi.org/10.1093/gbe/evad128>
- (20) Darolti I, Fong LJM, Sandkam BA, **Metzger DCH**, Mank JE (2023) Sex chromosome heteromorphism and the Fast-X effect in poeciliids. *Molecular Ecology*, 32, 4599–4609. <https://doi.org/10.1111/mec.17048>
- (19) Fong LJM, Darolti I, **Metzger DCH**, Morris J, Lin Y, Sandkam BA, Mank JE (2023) Evolutionary history of the *Poecilia picta* sex chromosomes. *Genome Biology and Evolution*, 15(3), evad030. <https://doi.org/10.1093/gbe/evad030>
- (18) **Metzger DCH**, Sandkam BA, Darolti I, Mank JE (2021) Rapid evolution of complete dosage compensation in *Poecilia*. *Genome Biology and Evolution*, 13(7), evab115. <https://doi.org/10.1093/gbe/evab155>
- (17) Furman BL, **Metzger DCH**, Darolti I, Wright AE, Sandkam BA, Almeida P, Shu JJ, Mank JE (2020) Sex chromosome evolution: so many exceptions to the rules. *Genome Biology and Evolution*, 12(6), 750-63. <https://doi.org/10.1093/gbe/evaa081>
- (16) **Metzger DCH**, Schulte PM (2018) Similarities in temperature-dependent gene expression plasticity across time scales in threespine stickleback (*Gasterosteus aculeatus*). *Molecular Ecology*, 27(10), 2381-2396. <https://doi.org/10.1111/mec.14591>
- (15) **Metzger DCH**, Schulte PM (2018) The DNA methylation landscape of stickleback reveals patterns of sex chromosome evolution and effects of environmental salinity. *Genome Biology and Evolution*, 10(3), 775-785. <https://doi.org/10.1093/gbe/evy034>
- (14) Harter TS, Sackville MA, Wilson JM, **Metzger DCH**, Egginton S, Esbaugh AJ, Farrell AP, Brauner CJ (2018) A solution to Nature's haemoglobin knockout: a plasma-accessible carbonic anhydrase catalyses CO₂ excretion in Antarctic icefish gills. *Journal of Experimental Biology*, 221(22). <https://doi.org/10.1242/jeb.190918>
- (13) **Metzger DCH**, Schulte PM (2017) Persistent and plastic effects of temperature on DNA methylation across the genome of threespine stickleback (*Gasterosteus aculeatus*). *Proceedings of the Royal Society of London B*, 284(1864), 20171667. <https://doi.org/10.1098/rspb.2017.1667>
- (12) Gibbons TC, **Metzger DCH**, Healy TM, Schulte PM (2017) Gene expression plasticity in response to salinity acclimation in threespine stickleback ecotypes from different salinity habitats. *Molecular Ecology*, 26(10), 2711-2725. <https://doi.org/10.1111/mec.14065>

- (11) **Metzger DCH**, Schulte PM (2016) Maternal stress has divergent effects on gene expression patterns in the brains of male and female threespine stickleback. *Proceedings of the Royal Society of London B*, 283(1839), 20161734. <https://doi.org/10.1098/rspb.2016.1734>
- (10) **Metzger DCH**, Healy TM, Schulte PM (2016) Conserved effects of salinity acclimation on thermal tolerance and hsp70 expression in divergent populations of threespine stickleback (*Gasterosteus aculeatus*). *Journal of Comparative Physiology B*, 186(7), 879-889. <https://doi.org/10.1007/s00360-016-0998-9>
- (9) **Metzger DCH**, Schulte PM (2016) Epigenomics in marine fishes. *Marine Genomics*, 30, 43-54. <https://doi.org/10.1016/j.margen.2016.01.004>
- (8) **Metzger DCH**, Hemmer-Hansen J, Schulte PM (2016) Conserved structure and expression of hsp70 paralogs in teleost fishes. *Comparative Biochemistry and Physiology Part D: Genomics and Proteomics*, 18, 10-20. <https://doi.org/10.1016/j.cbd.2016.01.007>
- (7) Timmins-Schiffman EB, Friedman CS, **Metzger DC**, White SJ, Roberts SB (2013) Genomic resource development for shellfish of conservation concern. *Molecular Ecology Resources*, 13(2), 295-305. <https://doi.org/10.1111/1755-0998.12052>
- (6) **Metzger DC**, Luckenbach JA, Dickey JT, Park LK, Beckman BR (2013) Development of a multiplex gene expression assay for components of the endocrine growth axis in Coho salmon, *General and Comparative Endocrinology*. 189, 134-140. <https://doi.org/10.1016/j.ygcen.2013.04.022>
- (5) **Metzger DC**, Pratt P, Roberts SB (2012) Characterizing the effects of heavy metal and *Vibrio* exposure on hsp70 expression in *Crassostrea gigas*. *Journal of Shellfish Research*, 31(3), 627-630. <https://doi.org/10.2983/035.031.0305>
- (4) **Metzger DC**, Luckenbach JA, Shimizu M, Beckman BR (2012) Normalizing for biology: accounting for technical and biological variation in levels of reference gene and insulin-like growth factor 1 (*igf1*) transcripts in fish livers. *Comp Biochem Physiol B*, 163(1), 7-14. <https://doi.org/10.1016/j.cbpa.2012.04.014>
- (3) **Metzger DC**, Elliott DG, Wargo A, Park LK, Purcell MK (2010) Pathological and immunological responses associated with differential survival of Chinook salmon following *Renibacterium salmoninarum* challenge. *Dis Aquat Org*, 90(1), 31-41. <https://doi.org/10.3354/dao02214>
- (2) Liu R, Woolner S, Johndrow JE, **Metzger D**, Flores A, Parkhurst SM (2008) Sisyphus, the *Drosophila* myosin XV homolog, traffics within filopodia transporting key sensory and adhesion cargos. *Development*, 135(1): 53-63. <https://doi.org/10.1242/dev.011437>

- (1) Orian A, Delrow JJ, Rosales Nieves AE, Abed M, **Metzger D**, Paroush Z, Eisenman RN, Parkhurst SM (2007) A Myc–Groucho complex integrates EGF and Notch signaling to regulate neural development. *PNAS*, 104:15771-15776.
<https://doi.org/10.1073/pnas.0707418104>

FUNDING RECEIVED

- 2020 Dovetail Genomics tree of life award (\$15,000 USD)
 2018 Stickleback Behavior and Evolution travel award (¥64,800)
 2016 UBC Zoology one-year Graduate Fellowship (\$16,000 CAD)
 2012 UBC Faculty of Graduate Studies Four Year Doctoral Fellowship (\$72,000 CAD)

TEACHING EXPERIENCE AND OUTREACH

Guest Lectures

- 2018 Molecular Adaptation of Animals to the Environment (BIOL450), UBC
 2012 Biology of shellfish (FISH250), UW

Teaching Assistant:

University of British Columbia

Attended lectures and helped administer active learning methods in the classroom three times a week, held regular office hours, hosted review sessions for exams, and developed exam questions.

- 2015 Fundamentals of physiology (BIOL260)
 2014 Fundamentals of physiology (BIOL260)
 2013 Fundamentals of physiology (BIOL260)

University of Washington

Developed, prepared, and presented lectures and laboratory curriculum for three hour lab sections twice a week. Attended lectures, developed exam questions, and led weekend field trips to shellfish farms, science field stations, and aboard research vessels.

- 2012 Biology of shellfish (FISH310)
 2010 Marine biology (FISH250)

Mentorship:

- 2022 Alieu Senghore – Master’s research student, UBC
 2021 Imogen Porter – NSERC undergraduate research student, UBC
 2016 Sam Mayer - Undergraduate research student, UBC
 2012 Ben Guidolin - Undergraduate research student, UBC
 2011 Miranda Kyle - Undergraduate research student, UW
 2011 Selina Cho - Undergraduate research student, UW
 2007 Peter Kirk - High school summer research student, FHCRC

Training:

- 2013 Biology Teachers Assistant professional developmental program, UBC

2010 TA Training Workshop, UW

Science Outreach and Inclusion:

- 2021 Examining Anti-Asian Racism + Xenophobia: A Current and Historical Conversation, UBC Office of Regional and International Community Engagement
- 2021 Unleashing My Superpowers: Global Leadership Women in STEM workshop, UBC Equity and Inclusion Office
- 2020 STEM mentoring café for grade school science classes, Vancouver, BC
- 2020 Speak Up! workshop, UBC Equity and Inclusion Office
- 2019 STEM mentoring café for grade school science classes, Vancouver, BC
- 2019 Diversity by design workshop, UBC Equity and Inclusion Office
- 2019 Mayne and Galiano Island BioBlitz, Galiano Island, BC
- 2012 Wang symposium panelist for a screening of “Our Thirsty Planet”, Tacoma, WA
- 2012 Ocean career day, Seattle Aquarium, Seattle, WA
- 2011 UW SAFS graduate student retreat coordinator, Friday Harbor, WA
- 2010 PAWS on Science, Pacific Science Center, Seattle, WA
- 2005-12 Life science volunteer, Seattle Aquarium, Seattle, WA
- 2005 President of the TriBeta Biology club, Ithaca College, Ithaca, NY

PROFESSIONAL ACTIVITIES

Invited Reviewer for Journals (Total: 22 reviews)

Molecular Ecology	Ecology and Evolution	PLoS ONE
Evolution Letters	Genome Biology and Evolution	Genomics
Journal of Experimental Biology	BMC Genomics	Epigenetics
Heredity	Comparative Biochemistry and Physiology Part B	

OTHER RESEARCH EXPERIENCE

- 2009-2010 ***Smithsonian Tropical Research Institute***, Panama City, Panama
 Research Internship
 Developed genomic markers to study the ecological effects of nutrient availability on the biodiversity of arbuscular mycorrhizal fungi in Inga root using DNA sequencing, microsatellite markers, and phylogenetic analysis.
- 2009 ***United States Geological Survey***, Seattle, WA
 GS-07 Research Technician
 Developed laboratory techniques to synthesize recombinant immune response proteins to develop monoclonal antibodies for the conservation and management of rainbow trout.
- 2007-2009 ***National Oceanic and Atmospheric Administration***, Seattle, WA
 Research Technician
 Developed multiplex gene expression assays and conducted field sampling to monitor growth and survival of wild salmon populations. Analyze the transcriptomic response of Chinook salmon to *R. salmoninarum* infection.
- 2005-2007 ***Fred Hutchinson Cancer Research Centre***, Seattle, WA
 Research Technician II

- Integrated molecular biology, biochemistry, genetics, and functional genomics to uncover the expression profile and protein interaction networks of transcription factors during embryogenesis.
- 2004 **Princeton University**, Department of Molecular Biology, Princeton NJ
Summer Undergraduate Research Program
Developed cell migration assay using HT1080 cells.
- 2002 **Tunison Laboratory of Aquatic Science**, Cortland, NY
Summer Undergraduate Research Student
Monitored biodiversity of freshwater aquatic ecosystems in upstate New York
- 2001-2005 **Ithaca College**, Biology Department, Ithaca, NY
Undergraduate Research Student
Characterize Cox2 mutations in *S. cerevisiae*.

SELECTED PRESENTATIONS (Presenting author only)

- 2021 Virtual Evolution (oral)
- 2021 Behavior, Ecology, and Evolution of Poeciliid Fishes Virtual Forum (oral)
- 2019 Ecology and Evolution Intercollegiate Retreat (UBC/SFU/UVic). Brackendale, BC (oral)
- 2019 UBC Biodiversity Research Seminar. Vancouver, BC (seminar)
- 2018 9th International Conference on Stickleback Behavior and Evolution. Kyoto, Japan (oral)
- 2017 Society for Integrative and Comparative Biology annual meeting New Orleans, LA (oral)
- 2014 APS intersociety meeting. San Diego, CA (poster)
- 2012 National Shellfisheries meeting. Seattle, WA (oral)
- 2011 Pacific Coast Shellfish Growers Association Regional Conference. Salem, OR (oral)
- 2011 World University Network symposium on Ocean Acidification. Friday Harbor, WA (poster)
- 2007 48th annual Drosophila Research Conference. Philadelphia, PA (poster)