

# Ryan Brady Shartau

University of Texas at Tyler

Department of Biology

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## EDUCATION

**Doctor of Philosophy, Zoology** 2017

*University of British Columbia, Vancouver, British Columbia, Canada*

Thesis title: Vertebrate preferential intracellular pH regulation during severe acute hypercarbia

Supervisor: Dr. Colin Brauner

Committee: Drs. Jeffrey Richards, William Milsom, Eric Taylor

**Master of Science, Biological Sciences** 2009

*University of Calgary, Calgary, Alberta, Canada*

Thesis title: Cilia driven embryonic rotation behaviour in response to hypoxia: Is this an adaptive behaviour in the pond snail *Helisoma trivolvis*?

Supervisor: Dr. Jeffrey Goldberg

Committee: Drs. Ken Lukowiak, Wic Wildering, George Bourne

**Bachelor of Science, Zoology** 2006

*University of Calgary, Calgary, Alberta, Canada*

## ACADEMIC AND RESEARCH EXPERIENCE

**2021 – Present** Assistant Professor; Department of Biology, University of Texas at Tyler

**2021** Mitacs Elevate Postdoctoral Fellow; University of Prince Edward Island

*Research focus*: Develop biomarkers of algal toxins in *Salmo salar*

Supervisor: Dr. Mark Fast

**2020 – 2021** Limited-Term Instructor; Vancouver Island University

Instructor-of-Record in the Fisheries and Aquaculture Program

**2019 – 2021** Research Scientist; Fisheries and Oceans Canada, Pacific Biological Station

*Research focus*: Physiological effect of exposure to cyanotoxins in salmonids

Supervisor: Dr. Stewart Johnson

**2018 – 2021** Affiliate; Vancouver Island University

**2018** Visiting Fellow; Fisheries and Oceans Canada, Pacific Biological Station

*Research focus*: Investigated 'net-pen liver disease' in farmed and wild salmonids

Supervisor: Dr. Stewart Johnson

## PUBLICATIONS

### PEER REVIEWED JOURNAL PUBLICATIONS

- 16) **Shartau RB**, Baker DW, Harter TS, Aboagye DL, Allen PJ, Val AL, Crossley II DA, Kohl ZF, Hedrick MS, Damsgaard D and Brauner CJ. 2020. Preferential intracellular pH regulation is a common trait amongst fish exposed to high CO<sub>2</sub>. *Journal of Experimental Biology*. 223(7). Profiled in 'Inside JEB'.
- 15) **Shartau RB**, Damsgaard C and Brauner CJ. 2019. Limits and patterns of acid-base regulation during elevated environmental CO<sub>2</sub> in fish. (Invited review). *Comparative Biochemistry and Physiology A*. 236: 110524.
- 14) Sackville MA\*, **Shartau RB\***, Damsgaard C, Hvas M, Phuong LM, Wang T, Bayley M, Huong DTT, Phuong NT and Brauner CJ. 2018. Water pH limits extracellular but not intracellular pH compensation in the CO<sub>2</sub> tolerant freshwater fish, *Pangasianodon hypophthalmus*. *Journal of Experimental Biology*. 221(23): 1-5. **\*equal contributors**
- 13) **Shartau RB**, Crossley II DA, Kohl ZF, Elsey RM and Brauner CJ. 2018. American alligator (*Alligator mississippiensis*) embryos tightly regulate intracellular pH during a severe acidosis. *Canadian Journal of Zoology*. 96(7): 723-727.
- 12) **Shartau RB**, Baker DW and Brauner CJ. 2017b. White sturgeon (*Acipenser transmontanus*) use different strategies for pH regulation depending on the type of acid-base disturbance. *Journal of Comparative Physiology B*. 187: 985-994.
- 11) **Shartau RB**, Brix KV and Brauner CJ. 2017a. Characterization of Na<sup>+</sup> uptake in white sturgeon (*Acipenser transmontanus*) to gain insight into the mechanism of acid-base and ion regulation in a basal, water-breathing actinopterygian. *Comparative Biochemistry and Physiology A*. 204: 197-204.
- 10) **Shartau RB**, Baker DW, Crossley II DA and Brauner CJ. 2016b. Preferential intracellular pH regulation: hypotheses and perspectives. (Invited commentary). *Journal of Experimental Biology*. 219(15): 2235-2244.
- 9) **Shartau RB**, Crossley II DA, Kohl ZF and Brauner CJ. 2016a. Embryonic common snapping turtles (*Chelydra serpentina*) preferentially regulate tissue pH during acid-base challenges. *Journal of Experimental Biology*. 219(13): 1994-2002.
- 8) **Shartau RB** and Brauner CJ. 2014. Acid-base and ion balance in fishes with bimodal respiration (Invited review). *Journal of Fish Biology*. 84(3): 682-704.
- 7) Harter TS, **Shartau RB**, Brauner CJ and Farrell AP. 2014. Validation of the i-STAT system for the analysis of blood parameters in fish. *Conservation Physiology*. 2(1):cou037.
- 6) Harter TS, **Shartau RB**, Baker DW, Jackson DC, Val AL and Brauner CJ. 2014. Preferential regulation of intracellular pH represents a general pattern of pH homeostasis in the armoured catfish (*Pterygoplichthys pardalis*). *Journal of Comparative Physiology B*. (6): 709-718.
- 5) Allen PJ, Mitchell ZA, DeVries RJ, Aboagye DL, Ciaramella M, Ramee S, Stewart HA and **Shartau RB**. 2014. Salinity effects on Atlantic sturgeon growth and osmoregulation. *Journal of Applied Ichthyology*. 30(6): 1229-1236.

- 4) **Shartau RB**, Harris S, Boychuk EC and Goldberg JI. 2010. Rotational behaviour of encapsulated pond snail embryos in diverse natural environments. *Journal of Experimental Biology*. 213(12): 2086-2093.
- 3) **Shartau RB**, Tam R, Patrick S and Goldberg JI. 2010. Serotonin prolongs survival of encapsulated pond snail embryos exposed to long-term anoxia. *Journal of Experimental Biology*. 213(9): 1529-1525.
- 2) Goldberg JI, Doran SA, **Shartau RB**, Pon JR, Ali DW, Tam R and Kuang S. 2008. Integrative biology of an embryonic respiratory behavior in pond snails: the “embryo stir-bar hypothesis” (Invited review). *Journal of Experimental Biology*. 211(11): 1729-1736.

#### PEER REVIEWED BOOK CHAPTER

- 1) Brauner CJ, **Shartau RB**, Damsgaard C, Esbaugh AJ, Wilson RW and Grosell M. 2019. Acid-base physiology and CO<sub>2</sub> homeostasis: Regulation and compensation in response to elevated environmental CO<sub>2</sub>. In *Fish Physiology Vol. 37 “Carbon Dioxide”*. (Grosell M, Munday P, Farrell AP and Brauner CJ eds). Series Editors Farrell AP and Brauner CJ, pp. 69-132. Elsevier, New York. (Invited contribution)

### RESEARCH FUNDING AND AWARDS

*As principal investigator; amounts in United States dollars (USD) unless indicated otherwise*

#### COMPETITIVE INTERNAL FUNDING

2021-2024      Rising STARS (Science and Technology Acquisition and Retention). The University of Texas System Board of Regents. **RB Shartau**. 09/2021 – 09/2024      \$175 000

### RESEARCH FUNDING AND AWARDS

*As research trainee; amounts in Canadian dollars (CAD) unless indicated otherwise*

#### MAJOR FELLOWSHIPS AND SCHOLARSHIPS

2022-2024	NSERC Postdoctoral Fellowship ( <i>declined</i> )	\$90 000
2021-2022	Mitacs Elevate Postdoctoral Fellowship ( <i>declined part of award</i> )	\$135 000
2018-2019	Visiting Fellowship in Government Laboratories	\$112 000
2016-2017	Cordula and Gunter Paetzold Fellowship (UBC)	\$18 000
2014-2015	Zoology Graduate Fellowship (UBC)	\$11 000
2014-2015	Cordula and Gunter Paetzold Fellowship (UBC)	\$18 000
2011-2014	NSERC Canada Graduate Scholarship Doctoral	\$105 000
2010-2014	Four Year Fellowship (UBC)	\$64 000
2009	Queen Elizabeth II Graduate Scholarship (Alberta government)	\$3 600
2006-2007	Alberta Government ACCESS Scholarship (University of Calgary)	\$15 000

## **OTHER SCHOLARSHIPS, AWARDS AND GRANTS**

2017	Frank Algar Memorial Scholarship	\$1000
2017	Society for Experimental Biology Conference Travel Grant	£140 GBP
2017	UBC Zoology Travel Award	\$500
2016	American Physiological Society Travel Award	\$480 USD
2016	UBC Zoology Travel Award	\$400
2014	American Physiological Society Travel Grant	\$800 USD
2014	Company of Biologists Travel Grant	£470 GBP
2014	NSERC CREATE Training Program Research Travel Award	\$500
2014	Canadian Society of Zoology Travel Grant	\$400
2013	Canadian Society of Zoology Travel Grant	\$400
2012	NSERC CREATE Training Program Research Travel Award	\$500
2011	Graduate Student Society Travel Award (UBC)	\$400
2009	Hoar Award Finalist – Best Student Paper, Canadian Society of Zoologists	

## **TEACHING AND MENTORING EXPERIENCE**

### **INSTRUCTOR OF RECORD**

2021	Physiology Lab (BIOL 3144), University of Texas at Tyler
2021	Physiology Lecture (BIOL 3343), University of Texas at Tyler
2021	Fish Husbandry II (FISH 127/327), Vancouver Island University
2020	Fish Husbandry I (FISH 227) Vancouver Island University
2020	Warm Water Fish Culture (FISH 231), Vancouver Island University

### **TEACHING ASSISTANT**

2017	Laboratory instructor, UBC (Human Physiology).
2015	Laboratory instructor, UBC (Human Physiology).
2009	Laboratory instructor, University of Calgary (Histology).
2006-2007	Laboratory instructor, University of Calgary (Invertebrate Zoology)

### **GUEST LECTURES AND MENTORING**

2020	Co-supervised two undergraduate NSERC USRA students at Vancouver Island University (K. Hua and L. Abruzzi)
2019	Guest panelist, Vancouver Island University (Current Topics in Biology).
2019	Co-supervised four Vancouver Island University summer students on research project investigating effect of high CO <sub>2</sub> and water pH on white sturgeon physiology.
2018, 2019	Vancouver Island University Affiliate lecturer on acid-base and ion regulation (Warm Water Fish Culture).
2018	Co-supervised visiting MSc student research project at Vancouver Island University (J. Shu).
2018	Guest panelist, Vancouver Island University (Current Topics in Biology).
2017	Guest lecturer, Vancouver Island University (Warm Water Fish Culture).
2015	Beaty Biodiversity Museum, Way Cool Seminar Series: Air Breathing Fishes are Way Cool Because..., UBC. <u>Invited talk.</u>
2011	Supervised undergraduate research in association with PhD dissertation on the effects of hypercarbia on acid-base regulation in Pacific lamprey (L. Gaffney). <i>Work presented at the 2011 Canadian Society of Zoology meeting.</i>
2009	Guest lecturer, University of Calgary (Histology).

2008-2009 Supervised undergraduate research in association with MSc dissertation on the behavioural response of pond snail embryo (S. Harris and E.C. Boychuk).  
*This work was published in the Journal of Experimental Biology.*

## PRESENTATIONS

\* *presenting author*

### NATIONAL AND INTERNATIONAL SCIENTIFIC MEETING ABSTRACTS

- 24) **Shartau RB\***, Turcotte L, Caballero Solares A, Snyman H, McCarron P, Bradshaw J, Rise M, Johnson SC. 2020. Physiological response of juvenile Atlantic Salmon (*Salmo salar*) and Chinook Salmon (*Oncorhynchus tshawytscha*) exposed to toxic cyanobacteria in coastal waters of British Columbia. *Canadian Society of Zoologists*. Online (virtual) meeting. May 17-21, 2021.
- 23) Perry I\*, Nemcek N, Hennekes M, Sastri A, Ross A\*, Johnson SC, **Shartau RB**, Locke A. Domoic Acid Surveillance in Pacific Canadian Waters: 2016 – 2020. *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems*. Online (virtual) meeting. March 2-4, 2021.
- 22) **Shartau RB\***, Turcotte L, Snyman H, McCarron P, Bradshaw J, Johnson SC. 2020. Microcystins in coastal waters of southern British Columbia and their effects on salmon health. *State of the Physical, Biological and Selected Fishery Resources of Pacific Canadian Marine Ecosystems*. Nanaimo, British Columbia. March 10-11, 2020.
- 21) **Shartau RB**, Snyman H, Turcotte L, McCarron P, Bradshaw JC and Johnson SC\*. 2019. Microcystins effects on Chinook and Atlantic Salmon: Investigating the etiology of Net Pen Liver Disease and sub-lethal effects. *19<sup>th</sup> International Conference on Disease of Fish and Shellfish*. Porto, Portugal. September 9-12, 2019.
- 20) Brauner CJ\* and **Shartau RB**. 2019. Responses of fish to freshwater CO<sub>2</sub> induced acidification. *10th International Congress on Comparative Physiology and Biochemistry*, Ottawa, Ontario. August 5-9, 2019.
- 19) **Shartau RB\***, Turcotte L, Snyman H, McCarron P, Bradshaw JC and Johnson SC. 2019. Physiological and transcriptomic response of juvenile Chinook and Atlantic Salmon exposed to microcystins: an investigation into the etiology of net-pen liver disease. *Aquaculture Canada*. Victoria, British Columbia. May 5-8, 2019.
- 18) Brauner CJ\* and **Shartau, R.B.** 2018. Evolutionary patterns of acid-base regulation in vertebrates. *American Physiological Society Intersociety Meeting. Comparative Physiology: Complexity and Integration*. New Orleans, Louisiana. October 25-28, 2018.
- 17) **Shartau RB\*** and Brauner CJ. 2018. Preferential intracellular pH regulation guards against severe environmental challenges to acid-base regulation. *International Congress on the Biology of Fish*. Calgary, Alberta. July 15-19. 2018.
- 16) **Shartau RB\*** and Brauner CJ. 2017. A paradigm shift in vertebrate acid-base regulatory strategy: preferential intracellular pH regulation as a broadly used strategy of pH regulation amongst vertebrates. *Society for Experimental Biology*. Gothenburg, Sweden. July 3-6, 2017.
- 15) Brauner CJ\*, **Shartau RB** and Baker DW. 2017. Preferential intracellular pH regulation in vertebrates. *Society for Experimental Biology*. Gothenburg, Sweden. July 3-6, 2017.

- 14) **Shartau RB\***, Baker DW and Brauner CJ. 2016. White sturgeon use different acid-base regulatory strategies for different acidoses. *International Congress on the Biology of Fish*. San Marcos, Texas. June 12-16, 2016.
- 13) **Shartau RB\***, Crossley II DA, Kohl ZF and Brauner CJ. 2015. Acid-base regulation during embryonic development in the snapping turtle (*Chelydra serpentina*). *Canadian Society of Zoologist*. Calgary, Alberta. May 25-29, 2015.
- 12) **Shartau RB\***, Brix KV and Brauner CJ. 2014. Characterization of Na<sup>+</sup> uptake in white sturgeon (*Acipenser transmontanus*) to gain insight into the mechanism of acid-base and ion regulation in a basal, water-breathing actinopterygians. *Canadian Society of Zoologists (Genomes to/aux Biomes)*. Montreal, Quebec. May 25-29, 2014.
- 11) **Shartau RB\***, Aboagye D, Allen PJ and Brauner CJ. 2014. CO<sub>2</sub> tolerance and acid-base regulation in paddlefish *Polyodon spathula*. *Aquaculture America*. Seattle, Washington. February 9-12, 2014. Invited talk.
- 10) **Shartau RB\***, Aboagye D, Allen PJ and Brauner CJ. 2013. American paddlefish (*Polyodon spathula*) offer insights into the evolution of pH regulation. *7<sup>th</sup> International Symposium on Sturgeon*. Nanaimo, British Columbia. July 21-25, 2013. Invited talk.
- 9) **Shartau RB\***, Crossley II DA, Kohl ZF, Hedrick MS, Eme J and Brauner CJ. 2013. Evolution of preferential pH<sub>i</sub> regulation in basal fishes; insight from the spotted gar. *Canadian Society of Zoologist*. Guelph, Ontario. May 13-17, 2013.
- 8) **Shartau RB\***, Baker D, Gaffney L, Close D and Brauner CJ. 2011. Acid-base regulation in lamprey during hypercarbia: Are all agnathans CO<sub>2</sub> tolerant? *Canadian Society of Zoologist*. Ottawa, Ontario. May 16-20, 2011.
- 7) Tam R, **Shartau RB** and Goldberg JI\*. 2010. Serotonin-enhanced survival of *Helisoma trivolvis* embryos during anoxia may involve mitochondrial membrane potential. *Society for Neuroscience*. San Diego, California. November 13-17, 2010.
- 6) **Shartau RB\***, Tam R and Goldberg JI. 2010. Anoxia tolerance mediated by serotonin regulation of energy metabolism in pond snail embryos. *Canadian Society of Zoologist*. Vancouver, British Columbia. May 13-17, 2010.
- 5) **Shartau RB\*** and Goldberg JI. 2009. Protective effect of serotonin during long-term exposure to anoxia in *Helisoma trivolvis* embryos. *Canadian Society of Zoologist*. Toronto, Ontario. May 12-16, 2009. \*Runner up for best oral presentation – Hoar Award\*
- 4) **Shartau RB\***, Harris S and Goldberg JI. 2009. Regulation of embryonic rotation by environmental factors (poster). *Canadian Society of Zoology*. Toronto, Ontario. May 12-16, 2009.
- 3) **Shartau RB\*** and Goldberg JI. 2009. Serotonin enhances survival of *Helisoma trivolvis* embryos exposed to long-term anoxia (poster). *Society for Neuroscience*. Chicago, Illinois. October 17-21, 2009.
- 2) **Shartau RB\***, Harris S, and Goldberg JI. 2008. Identification of environmental regulators of embryonic rotation in pond snails (poster). *Annual Research Symposium of the Montana Chapter of the Society for Conservation Biology*. Missoula, Montana. October 9-10, 2008.
- 1) **Shartau RB\*** and Goldberg JI. 2007. Effects of chloral hydrate on cilia and rotational behavior in embryos of the pond snail, *Helisoma trivolvis*. *Canadian Society of Zoologist*. Montreal, Quebec. May 21-25, 2007.

## SEMINAR PRESENTATIONS

- 2021 The morphological and physiological consequences of salmon exposed to marine algal toxins in coastal British Columbia. Fisheries and Oceans Canada Invited Seminar Series.
- 2017 Preferential intracellular pH regulation in vertebrates. UBC Zoology Comparative Physiology Seminar Series.
- 2016 Strategy of acid-base regulation shifts during development of snapping turtles. UBC Zoology Comparative Physiology Seminar Series.
- 2015 Acid-base regulation during reptilian development. UBC Zoology Comparative Physiology Seminar Series.
- 2014 Na<sup>+</sup> uptake during acid-base regulation in a primitive fish. UBC Zoology Graduate Student Association Symposium.
- 2013 An atypical pattern of acid-base regulation: Preferential intracellular pH regulation. UBC Zoology Comparative Physiology Seminar Series.
- 2013 Acid-base regulation in a basal air breathing fish: Spotted gar. UBC Zoology Comparative Physiology Seminar Series.
- 2011 Acid-base regulation in agnathans. UBC Zoology Comparative Physiology Seminar Series.
- 2010 Cilia driven rotation behavior in response to hypoxia in pond snails. UBC Zoology Comparative Physiology Seminar Series.
- 2008 Cilia driven rotation behavior in response to hypoxia: An adaptive behavior in the pond snail *Helisoma trivolvis*? Univ. of Calgary Biological Sciences Graduate Seminar Series.
- 2007 Cilia driven rotation behavior of *Helisoma trivolvis* in response to hypoxia. Univ. of Calgary Biological Sciences Graduate Seminar Series.

## PROFESSIONAL DEVELOPMENT/WORKSHOPS/COURSES

- 2021 RNA-Seq Analysis (Canadian Bioinformatics Workshop)
- 2021 Working Effectively with Indigenous Peoples Training (Fisheries and Oceans Canada (DFO))
- 2021 Indigenous Learning Training (Fisheries and Oceans Canada)
- 2019 Emergency First Aid & CPR/AED Level C (Canadian Red Cross)
- 2018 Time Series Analysis in 'R' Workshop (Ghement Statistical Consulting)
- 2018 Fish Transport Course (DFO Science Aquarium Services)
- 2018 General Fish Husbandry (DFO Science Aquarium Services)
- 2018 Experimental Fish (Canadian Aquaculture Institute)
- 2017 Comparative phylogenetic analysis workshop (Department of Zoology, UBC)
- 2017 Biology Program Teaching Assistant Professional Development (BioTAP) (UBC)
- 2016 Instructional Skills Workshop (UBC)
- 2016 Special Topics in 'R' Workshop Series (UBC)
- 2014 International graduate course on the Physiology of Air-Breathing Fish in the Mekong Delta: Basic, Applied and Conservation (Can Tho University, Can Tho, Vietnam)
- 2014 The 'R' environment (UBC)
- 2013 Radionuclide Safety and Methodology (UBC)
- 2013 'R' Basics and Beyond (UBC)
- 2011 Canadian Council on Animal Care / National Institutional Animal User Training Program (UBC)
- 2009 University Teaching Certificate (University of Calgary)
- 2008 Instructional Skills Workshop (University of Calgary)

## **SERVICE AND LEADERSHIP**

- 2021 Advisor and Consultant – Fisheries and Oceans Canada Accessibility Action Plan
- 2019-2021 Network for Persons with Disabilities – Fisheries and Oceans Canada
- 2019-2021 Pacific Region Executive Committee Representative – Fisheries and Oceans Canada Science Early Career Network
- 2019-2020 Conference Working Group – Fisheries and Oceans Canada Science Early Career Network
- 2019 Participant – Canadian Science Advisory Secretariat National Peer Review, Harmful Algal Events in Canadian Marine Ecosystems
- 2018 Mentor and Chaperone – Canadian Hard-of-Hearing Youth Forum (Ottawa, Canada)
- 2017-2019 Director – Canadian Hard-of-Hearing Young Adults Network Executive Council
- 2010-2011 Treasurer – Zoology Graduate Student Association
- 2010-2011 Member of the UBC Zoology building space allocation committee
- 2010 Local Organizing Committee – 2010 Canadian Society of Zoologists Annual Meeting, Vancouver BC.

**Journal reviewer:** Aquaculture, Aquatic Biology, Biology Open, Comparative Biochemistry and Physiology A, Comparative Biochemistry and Physiology B, Fish Physiology and Biochemistry, Marine Ecology Progress Series, Physiological and Biochemical Zoology.