
CASEY MUELLER Ph.D.

Assistant Professor

Department of Biological Sciences
California State University San Marcos
San Marcos, CA 92096 USA
+1 760 750 8508

cmueller@csusm.edu

<http://developmentalphysiology.weebly.com>

RESEARCH

My research interests lie in comparative developmental physiology, with a focus on the fundamental concepts of phenotypic plasticity and critical windows during development. I am fascinated by how physiological systems develop, interact and respond to the environment and how developmental physiology influences animals later in life. I work with a range of organisms, including invertebrates, fishes, amphibians, birds and reptiles, to investigate respiratory, cardiovascular, and osmoregulatory function under different environmental conditions across development.

EDUCATION

Doctor of Philosophy 2011 **University of Adelaide, Australia**
Thesis title: Developmental energetics and gas exchange in amphibians and lungfish
Supervisor: Roger S. Seymour

Honours Degree of Bachelor of Science 2006 **University of Adelaide, Australia**
Thesis title: Effects of Spatial Variation on Competition between Ward's Weed, *Carrichtera annua* (L.)
Aschers (Brassicaceae), and Native Annuals from Arid South Australia
First class honours Supervisor: José M. Facelli

Bachelor of Science 2005 **University of Adelaide, Australia**
Double Major in Environmental Biology and Botany, Distinction average (*Magna Cum Laude*)

PROFESSIONAL HISTORY

Assistant Professor Aug 2015 - Present **California State University San Marcos, USA**
Department of Biological Sciences

Postdoctoral Fellow Aug 2013 - July 2015 **McMaster University, Canada**
Department of Biology
Supervisors: Dr. Joanna Wilson and Dr. Doug Boreham, Primary Investigators
Embryonic metabolism and energetics of lake whitefish under different thermal regimes
Mentorship of 3 Ph.D., 1 Masters and 2 undergraduate students

Sessional Faculty Jan 2015 - April 2015 **McMaster University, Canada**
Department of Biology
BIO 3ZZ3 (Topics in Physiology) Fall/Winter 2014/2015 (third year seminar course)

Postdoctoral Research Associate Sept 2011 - July 2013 **University of North Texas, USA**
Developmental Integrative Biology, Department of Biological Sciences
Supervisor: Dr. Warren W. Burggren, Primary Investigator
Cardiovascular, renal and acid-base physiology of avian and reptilian embryos
Lab managerial tasks and mentorship of 2 Ph.D., 4 Masters and 4 undergraduate students

Laboratory Instructor 2008 - 2011

University of Adelaide, Australia

Department of Ecology and Evolutionary Biology

ENV BIOL 3003 (Ecophysiology of Animals III) Spring 2010 (Thermoregulation, Respiration, Circulation, Osmoregulation, Allometry), ENV BIOL 2000 (Zoology II) Autumn 2008 (Ecophysiology, Vertebrate Functional Morphology), Autumn 2011 (Vertebrate Functional Morphology, Vertebrate Evolution)

Research Assistant 2008

University of Adelaide, Australia

Department of Ecology and Evolutionary Biology

Comparative Physiology laboratory, Supervisor: Professor Roger Seymour

TEACHING AND MENTORING

Classroom Instruction

California State University San Marcos

Developmental Physiology (lecture and lab)

Comparative Animal Physiology (lecture and lab)

Physiological Ecology (lecture)

Physiology Seminar

Undergraduate laboratory teaching assistant supervision: 6 students

McMaster University

Topics in Physiology (Seminar)

University of Adelaide

Ecophysiology of Animals

Zoology

Research Students Mentored

Undergraduates

Julie Bucsky, Fall 2016-

Samuel Woldeyohannes, Fall 2016-

Morgan Rentschler, Fall 2016-

Christopher Melendez, Fall 2015-

Jonathan Kramer, Fall 2015-Summer 2016

PUBLICATIONS AND PRESENTATIONS

Peer-reviewed Publications

*undergraduate students

Mueller CA, Tazawa H, Burggren WW (2017) Dynamics of acid-base and hematological regulation in day 15 chicken embryos (*Gallus gallus domesticus*) exposed to graded hypercapnia and hypoxia. *Resp Physiol Neurobiol* 239 55-63 (doi: [10.1016/j.resp.2017.02.001](https://doi.org/10.1016/j.resp.2017.02.001))

Mueller CA, Doyle L*, Eme J, Manzon RG, Somers CM, Boreham DR, Wilson JY (2017) Lipid content and fatty acid profile during lake whitefish embryonic development at different incubation temperatures. *Comp Biochem Physiol A* 203 201-209 (doi: [10.1016/j.cbpa.2016.09.018](https://doi.org/10.1016/j.cbpa.2016.09.018))

Lee AH*, Eme J, Mueller CA, Manzon RG, Rogers CM, Boreham DR and Wilson JY (2016) The effects of cumulative acute heat shock exposures on morphology and survival of Lake whitefish (*Coregonus clupeaformis*) embryos. *J Therm Biol* 57 11-20 (doi: [10.1016/j.jtherbio.2016.01.010](https://doi.org/10.1016/j.jtherbio.2016.01.010))

Mueller CA, Willis E*, Burggren WW (2016) Salt sensitivity of the morphometry of *Artemia franciscana* during development: A demonstration of 3-D critical windows. J Exp Biol 219 571-581 (doi:[10.1242/jeb.125823](https://doi.org/10.1242/jeb.125823))

Sreetharan S*, Thome C, Mitz C, Eme J, **Mueller CA**, Hulley EN*, Manzon RG, Somers CM, Boreham DR and Wilson JY (2015) Embryonic development of lake whitefish (*Coregonus clupeaformis*): a staging series, analysis of growth and impacts of fixation. J Fish Biol 87 539-558 (doi:[10.1111/jfb.12725](https://doi.org/10.1111/jfb.12725))

Burggren WW, **Mueller CA** and Tazawa H (2015) Hypercapnic thresholds for embryonic acid-base metabolic compensation and hematological regulation during CO₂ challenges in layer and broiler chicken strains. Resp Physiol Neurobiol 215 1-12 (doi:[10.1016/j.resp.2015.04.008](https://doi.org/10.1016/j.resp.2015.04.008))

Mueller CA, Eme J, Burggren WW, Roghair RD and Rundle SD (2015) Challenges and opportunities in developmental integrative physiology. Comp Biochem Physiol A 184 113-124 (doi:[10.1016/j.cbpa.2015.02.013](https://doi.org/10.1016/j.cbpa.2015.02.013))

Mueller CA, Eme J, Manzon RG, Somers CM, Boreham DR and Wilson JY (2015) Embryonic critical windows: Changes in incubation temperature alter hatchling phenotype, survival and cost of development in Lake whitefish (*Coregonus clupeaformis*). J Comp Physiol B 185 315-331 (doi:[10.1007/s00360-015-0886-8](https://doi.org/10.1007/s00360-015-0886-8))

Burggren WW and **Mueller CA** (2015) Developmental critical windows and sensitive periods as 3-D constructs in time and space. Physiol Biochem Zool 88 91-102 (doi:[10.1086/679906](https://doi.org/10.1086/679906))

Eme J, **Mueller CA**, Manzon RG, Rogers CM, Boreham DR and Wilson JY (2015) Critical windows in embryonic development: Shifting incubation temperatures alter heart rate and oxygen consumption of Lake Whitefish (*Coregonus clupeaformis*) embryos and hatchlings. Comp Biochem Physiol A 179 71-80 (doi:[10.1016/j.cbpa.2014.09.005](https://doi.org/10.1016/j.cbpa.2014.09.005))

Mueller CA, Crossley II DA and Burggren WW (2014) The actions of the renin-angiotensin system on cardiovascular and osmoregulatory function in embryonic chickens (*Gallus gallus domesticus*). Comp Biochem Physiol A 178 37-45 (doi:[10.1016/j.cbpa.2014.08.004](https://doi.org/10.1016/j.cbpa.2014.08.004))

Mueller CA, Tazawa H and Burggren WW (2014) Dynamics of acid-base metabolic compensation and hematological regulation in response to CO₂ challenges in embryos of the chicken (*Gallus gallus*) J Comp Physiol B 184 641-649 (doi:[10.1007/s00360-014-0822-3](https://doi.org/10.1007/s00360-014-0822-3))

Burggren WW, Christoffels VM, Crossley II DA, Enok S, Farrell AP, Hedrick MS, Hicks JW, Jensen B, Moorman AFM, **Mueller CA**, Skovgaard N, Taylor EW and Wang T (2014) Comparative cardiovascular physiology: Future trends, opportunities and challenges. Acta Physiol 210 257-276 (doi:[10.1111/apha.12170](https://doi.org/10.1111/apha.12170))

Mueller CA, Burggren WW and Crossley II DA (2013) ANG II and baroreflex control of heart rate in embryonic chickens (*Gallus gallus domesticus*). Am J Physiol Reg Int Comp Physiol 305 R855-R863 (doi:[10.1152/ajpregu.00298.2013](https://doi.org/10.1152/ajpregu.00298.2013))

Mueller CA, Tazawa H and Burggren WW (2013) Dynamics of metabolic compensation and hematological changes in chicken (*Gallus gallus*) embryos exposed to hypercapnia with varying oxygen. Resp Physiol Neurobiol 185 272-280 (doi:[10.1016/j.resp.2012.10.002](https://doi.org/10.1016/j.resp.2012.10.002))

Mueller CA, Augustine S, Kooijman SALM, Kearney MR and Seymour RS (2012) The trade-off between maturation and growth during accelerated development in frogs. Comp Biochem Physiol A 163 95-102 (doi:[10.1016/j.cbpa.2012.05.190](https://doi.org/10.1016/j.cbpa.2012.05.190))

Mueller CA and Seymour RS (2012) Analysis of cutaneous and internal gill gas exchange morphology in early larval amphibians, *Pseudophryne bibronii* and *Crinia georgiana*. J Comp Biochem Physiol B 182 813-820 (doi:[10.1007/s00360-012-0667-6](https://doi.org/10.1007/s00360-012-0667-6))

Mueller CA and Seymour RS (2011) The Regulation Index: a new method for assessing the relationship between oxygen consumption and environmental oxygen. Physiol Biochem Zool 84 522-532 (doi:[10.1086/661953](https://doi.org/10.1086/661953))

Mueller CA, Joss JMP and Seymour RS (2011) Effects of environmental oxygen on development and respiration of Australian lungfish (*Neoceratodus forsteri*) embryos. J Comp Physiol B 181 941-952 (doi:[10.1007/s00360-011-0573-3](https://doi.org/10.1007/s00360-011-0573-3))

Mueller CA and Seymour RS (2011) The importance of perivitelline fluid convection to oxygen uptake of *Pseudophryne bibronii* eggs. Physiol Biochem Zool 84 299-305 (doi:[10.1086/659650](https://doi.org/10.1086/659650))

Mueller CA, Joss JMP and Seymour RS (2011) The energy cost of embryonic development in fishes and amphibians, with emphasis on new data from the Australian lungfish, *Neoceratodus forsteri*. J Comp Physiol B 181 43-52 (doi:[10.1007/s00360-010-0501-y](https://doi.org/10.1007/s00360-010-0501-y))

Book Chapters

Mueller CA (2015) Developmental Physiology of the Australian Lungfish, *Neoceratodus forsteri*. In: Phylogeny, Anatomy and Physiology of Ancient Fishes (G. Zaccane, K. Dabrowski, M.S. Hedrick, J.M.O. Fernandes & J.M. Icardo, Eds.), CRC Press, Boca Raton, Florida, p 57-80.

Mueller CA, Burggren WW, and Tazawa H (2015) The Physiology of the Avian Embryo. In: "Sturkie's Avian Physiology 6e" (C. Scanes, Ed.), Elsevier, Amsterdam, p 739-766.

Selected Presentations

Mueller CA (2016) Effects of increased temperature during critical windows of development on embryonic and hatching lake whitefish phenotypes. Society for Experimental Biology. Brighton, UK. (Invited speaker)

Mueller CA, Eme J, Manzon RG, Somers CM, Boreham DR and Wilson JY (2016) Hatchling phenotype of lake whitefish incubated at increased temperature during critical windows of development. Experimental Biology. San Diego, USA. (poster)

Eme J, **Mueller CA**, Melendez C*, Manzon RG, Somers CM, Boreham DR and Wilson JY (2016) Daily, incremental changes in incubation temperature alter metabolism and hatchling phenotype of developing lake whitefish. Experimental Biology. San Diego, USA. (poster)

Mueller CA, Eme J, Manzon RG, Somers CM, Boreham DR and Wilson JY (2015) Effects of increased temperature during critical windows of development on the hatchling phenotype of Lake whitefish (*Coregonus clupeaformis*). Canadian Society of Zoologists. Calgary, Canada. (oral presentation)

Eme J, **Mueller CA**, Boreham DR, Manzon RG, Somers CM and Wilson JY (2015) Effects of daily, incremental changes in incubation temperature on the metabolism of Lake Whitefish embryos and hatchlings. Canadian Society of Zoologists. Calgary, Canada.

Mueller CA (2014) Critical windows in animal development: Stressor dose, effect size and experimental design. APS Intersociety Meeting: Comparative Approaches to Grand Challenges in Physiology. San Diego, USA. (Invited speaker)

Mueller CA, Eme J, Boreham DR, Manzon RG, Somers CM and Wilson JY (2014) Critical windows in embryonic development: Metabolic effects of shifting temperatures in whitefish embryos (*Coregonus clupeaformis*). Canadian Society of Zoologists. Montreal, Canada. (poster)

Eme J, **Mueller CA**, Boreham DR, Manzon RG, Somers CM and Wilson JY (2014) Critical windows in embryonic development: Cardiac and survival effects of shifting temperatures in whitefish embryos (*Coregonus clupeaformis*). Canadian Society of Zoologists. Montreal, Canada.

Mueller CA, Crossley II DA and Burggren WW (2013) Angiotensin II and developmental cardiovascular-renal interactions in embryonic chickens. Experimental Biology. Boston, USA. (oral presentation and poster)

Mueller CA, Burggren WW and Tazawa H (2013) Avian embryos tolerate severe hypoxic/hypercapnic gas challenges and submersion in water - evidence for acid-base and haematological regulation. UNT - UAEM Ecophysiology Workshop. Malinalco, Mexico. (oral presentation).

Mueller CA, Augustine S, Kooijman SALM, Kearney MR and Seymour RS (2012) The trade-off between maturation and growth during accelerated development in vertebrates. Experimental Biology. San Diego, USA. (poster)

Mueller CA, Joss JMP and Seymour RS (2010) The low developmental cost of the Australian lungfish compared to other fishes and amphibians. Australian and New Zealand Society for Comparative Physiology and Biochemistry. Australian National University, Canberra, Australia (oral presentation)

Mueller CA, Joss JMP and Seymour RS (2010) The low developmental cost of the Australian lungfish compared to other fishes and amphibians. Society for Experimental Biology. Prague, Czech Republic. (oral presentation)

Mueller CA (2008) Oxygen consumption in embryos and larvae: examining the critical point. Australian and New Zealand Society for Comparative Physiology and Biochemistry. University of Sydney, Sydney, Australia. (oral presentation)

AWARDS AND GRANTS

Awards

New Investigator Award, Comparative and Evolutionary Physiology Section American Physiological Society (US\$1400)	2016
Research Recognition Award, Comparative and Evolutionary Physiology Section American Physiological Society (US\$500)	2013
Best student presentation, Australian and New Zealand Society for Comparative Physiology and Biochemistry Annual Conference, Canberra (AU\$200)	2010
University Medal for Outstanding Academic Performance for a Bachelor's Degree with Honours (4 years total) University of Adelaide, only 18 medals awarded university wide (25,000 students) annually	2006
John Bagot Medal for the best Honours thesis in Botany awarded annually, University of Adelaide	2006
The Ernest Ayers Scholarship to undertake Honours in Botany awarded annually, University of Adelaide (AU\$750)	2005

J.G. Wood Memorial Prize for Undergraduate Botany awarded annually, University of Adelaide (AU\$300)	2005
Reed New Holland Book Prize for Undergraduate Zoology awarded annually, University of Adelaide	2004
Grants	
Society for Experimental Biology New Appointed Academics Travel Grant (£1000)	2016
Society for Experimental Biology Annual Meeting Travel Grant (£180)	2016
CSUSM Faculty Center Professional Development Grant \$500	2016
Canadian Society of Zoologists Conference Travel Grant (CA\$250)	2015
American Physiological Society, Intersociety Meeting in Comparative Physiology, San Diego Symposium chair/Organizer of 'Challenges from the Very Beginning: Developmental Physiology, Epigenetics, and Critical Windows', (US\$2000)	2014
Journal symposium sponsorship (Comparative Biochemistry and Physiology) American Physiological Society Intersociety Meeting in Comparative Physiology (US\$1000)	2014
Australian Geographic Society Research Grant for PhD research (AU\$1000)	2008
Research Scholarship from the Cooperative Research Centre for Australian Weed Management for Honours research (AU\$4000)	2006

MEMBERSHIPS

American Physiological Society	2011 -
Society for Experimental Biology	2010 -
Canadian Society of Zoologists	2014 - 2015
Australian & New Zealand Society for Comparative Physiology & Biochemistry	2008 - 2011
Biological Society of South Australia	2005 - 2008