Dr. Caroline Williams, PhD

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Research Field

Evolution of metabolic physiology in ectotherms

Present Position

Postdoctoral Associate (Jan 2012 – present), Department of Entomology and Nematology, University of Florida, Gainesville.

Project: Physiological and biochemical processes underlying cold adaptation in *Drosophila melanogaster* (Advisor: Dr. Daniel A. Hahn)

Academic training

Dates	Institution	Degree (major)	Additional Information
2007 - 2011	University of Western Ontario, Canada	Ph.D. (Biology)	Advisor: Dr. Brent J. Sinclair. Dissertation title: Overwintering energetics of Lepidoptera: the effects of local adaptation and plasticity.
2002 - 2004*	University of Otago, New Zealand	M.Sc. (Zoology)	Co-advisors: Dr. Robert Poulin and Dr. Brent J. Sinclair. Thesis title: Physiological mechanisms behind parasitic manipulation of host behavior by a mermithid nematode.
1999 - 2001	University of Otago, New Zealand	B.Sc. (Zoology)	

*See Work History section for details of positions held from 2004-2007.

Scholarships and Awards

Date	Description
May 2011	**Ontario Graduate Scholarship**, Ontario Provincial Government. Highly competitive for international students (success rate < 1%).
Apr 2011	**Ruth Horner Arnold Fellowship**, Department of Biology, University of Western Ontario. For research excellence.
Apr 2011	**Epcor Water Student Travel Award**, Canadian Society of Zoologists. Support to attend meeting, based on quality of abstract.
May 2010 & 2011	**Graduate Thesis Research Award,** University of Western Ontario. Funds to support research.

Aug 2010 **Scholander Award and Best Oral Presentation Award**, American Physiological Society. The society's top award for a trainee in comparative and evolutionary physiology, including PhD and postdoctoral students.

May 2010 **Graduate Student Teaching Award**, Faculty of Science**,** University of Western Ontario. One faculty-nominated teaching excellence award given annually.

May 2010 **Travel Awards**, Canadian Society of Zoologists and University of Western Ontario. Support to attend Canadian Society of Zoologists meeting.

Mar 2010 **Ruth and Robert Lumsden Fellowship**, University of Western Ontario. For research excellence, 4/year awarded. Generally reserved for domestic students, with international students (such as myself) considered only if "exceptional".

Feb 2009 **Shell Sweeney Scholarship**, Graduate Teaching Assistant's Union, University of Western Ontario. For demonstrating a balance of academic, research, and outreach contributions.

Jan 2003 **Postgraduate Scholarship**, Division of Science, University of Otago. Full tuition and stipend for final year of Masters degree, based on research ability and grades.

Research Output

15 peer-reviewed publications, **11** conference presentations, and **8** invited seminars.

Publications *(undergraduate mentees denoted with ^{U})*

Published

15) Lake, S.L.^{U}, MacMillan, H.A., **Williams, C.M.**, Sinclair, B.J. (2013) Static and dynamic approaches yield similar estimates of thermal sensitivity of insect metabolism. ***Journal of Insect Physiology*** 59:761-766.

14) Jensen, K., Sanchez-Garcia, J., **Williams, C.M.**, Khare, S., Mathur, K., Graze, R.M., Hahn, D.A., McIntyre, L.M., Rincon-Limas, D., Fernandez-Funez, P. (2013) Purification of transcripts and metabolites from *Drosophila* heads. ***Journal of Visualised Experiments*** 73: e50245.

13) MacMillan, H.A., **Williams, C.M.,** Staples, J.F., Sinclair, B.J. (2012) Reestablishment of ion homeostasis during insect chill coma recovery. ***Proceedings of the National Academy of Sciences U.S.A.*** doi: 10.1073/pnas.1212788109.

12) Sinclair, B.J., Stinziano, J.R.^{U}, **Williams, C.M.**, MacMillan, H.A., Marshall, K.E., Storey, K.B. (2013) Real-time measurements of metabolic rate during freezing and thawing of the wood frog, *Rana sylvatica*: implications for overwinter energy use. ***Journal of Experimental Biology*** 216:292-302.

11) Sinclair, B.J.; **Williams, C.M.**; Terblanche, J.S. (2012) Variation in thermal performance among insect populations. ***Physiological and Biochemical Zoology*** 85:594-606.

10) **Williams, C.M.**, J.J. Hellmann and B.J. Sinclair (2012a). Lepidopteran species differ in susceptibility to winter warming. ***Climate Research*** 53:119-130.

9) **Williams, C.M.**, K.E. Marshall, H.A. MacMillan, J.D.K. Dzurisin, J.J. Hellmann and B.J. Sinclair (2012b) Thermal variability increases the impact of autumnal warming and drives metabolic depression in an overwintering butterfly. ***PLoS ONE*** 7:e34470.

8) MacMillan, H.A.; **Williams, C.M.**; Staples, J.F.; Sinclair, B.J. (2012) Metabolism and energy supply below the critical thermal minimum of a chill-susceptible insect. ***Journal of Experimental Biology*** 215: 1366-1372.
7) **Williams, C.M.;** Thomas, R.H.; MacMillan, H.A.; Marshall, K.E.; Sinclair, B.J. (2011) Triacylglyceride measurement in small quantities of homogenised insect tissue: comparisons and caveats. ***Journal of Insect Physiology*** 57:1602-1613.
6) Lalouette, L.; **Williams, C.M.**; Cottin, M.; Sinclair, B.J.; Renault, D. (2011a) Thermal biology of the alien ground beetle *Merizodus soledadinus* introduced to the Kerguelen Islands. ***Polar Biology*** 35: 509-517.
5) Lalouette, L., **Williams, C.M.**, Hervant, F., Sinclair, B.J., Renault D. (2011b) Metabolic rate and oxidative stress in insects exposed to low temperature thermal fluctuations. ***Comparative Biochemistry and Physiology A*** 158:229-34.
4) Bazinet, A.L.[U]; Marshall, K.E.; MacMillan, H.A.; **Williams C.M.**; Sinclair, B.J. (2010) Rapid changes in desiccation resistance in *Drosophila melanogaster* are facilitated by changes in cuticular permeability. ***Journal of Insect Physiology*** 56:2006-12.
3) **Williams, C.M.,** Pelini, S. L., Hellmann, J. J., & Sinclair, B. J. (2010) Intra-individual variation allows an explicit test of the hygric hypothesis for discontinuous gas exchange in insects. ***Biology Letters***, **6**: 274-277.
2) Pelini, S.L.; Dzurisin, J.D.K; Prior, K.M., **Williams, C.M.;** Marsico, T.D; Sinclair, B.J.; Hellmann, J.J. (2009) Translocation experiments with butterflies reveal limits to enhancement of poleward populations under climate change. ***Proceedings of the National Academy of Sciences U.S.A.*****106**:11160-5.
1) **Williams, C.M.;** Poulin, R. & Sinclair, B.J (2003) Increased haemolymph osmolality suggests a new route for behavioral manipulation of *Talorchestia quoyana* (Amphipoda: Talitridae) by its mermithid parasite. ***Functional Ecology*** **18**:685-91.

Presentations *(Presenting author underlined, undergraduate mentees denoted with [U])*

Conference presentations

11) **Williams, C.M.,** Watanabe, M., Morgan, T., Edison, A.S., Boroujerdi, A., Hahn, D.A. Evolution of energy metabolism in cold-adapted *Drosophila melanogaster*. International Symposium on the Environmental Physiology of Ectotherms and Plants 5 (ISEPEP5), London ON Canada 2013.
10) **Williams, C.M.,** Watanabe, M., Morgan, T., Edison, A.S., Boroujerdi, A., Hahn, D.A. Selection for cold tolerance alters maintenance of metabolic homeostasis in *Drosophila melanogaster*. Computational Biomedicine, Gainesville FL 2013.
9) **Williams, C.M.,** Watanabe, M., Morgan, T., Edison, A.S., Boroujerdi, A., Hahn, D.A. Selection for cold tolerance alters maintenance of metabolic homeostasis during cold exposure in *Drosophila melanogaster*. Society of Integrative and Comparative Biology (SICB), San Francisco CA 2013.
8) Castellanos, L.[U], Silverberg, R. [U], Morgan, T., **Williams, C.M.**, Hahn, D.A. Evolution of energy metabolism in cold-adapted *Drosophila melanogaster*. SICB, San Francisco CA 2013 (poster).

7) **Williams, C.M.,** Watanabe, M., Egge, A., Castellanos, L[U]., Silverberg, R.[U], Morgan, T., Edison, A.S., Boroujerdi, A., Hahn, D.A. Integrating functional and genetic information

to study the evolution of stress resistance in *Drosophila melanogaster*. Florida Genetics Conference, Gainesville FL 2012 (poster).

6) **Williams, C.M.**, Chick, W.D. [U], Sinclair, B.J. Metabolic compensation mitigates the impact of winter warming in the Fall Webworm. SICB, Charleston NC 2012.
5) **Williams, C.M.**; Marshall, K.E.; MacMillan, H.; Dzurisin, J. ; Renault, D.; Hellmann, J.J.; Sinclair, B.J. Patterns and consequences of metabolic suppression in response to high daily thermal variability in a skipper butterfly. ISEPEP4, Rennes France 2011.
2nd prize, Best Oral Presentation.
4) **Williams, C.M.**; Marshall, K.E.; MacMillan, H.; Dzurisin, J. ; Hellmann, J.J.; Sinclair, B.J. Patterns and consequences of metabolic suppression in response to high daily thermal variability in a skipper butterfly. Canadian Society of Zoologists (CSZ), Ottawa ON 2011.
Hoar Award finalist.
3) **Williams, C.M.**; Marshall, K.E.; MacMillan, H.; Chick, W. [U]; Bazinet, A. [U]; Hellmann, J.J.; Sinclair, B.J. Energetic costs of increasing thermal variability: an exploration of the mitigating effects of plasticity in Lepidoptera. American Physiological Society, Denver CO 2010.
Scholander Award and Best Oral Presentation.
2) **Williams, C.M.**; Marshall, K.E.; Sobek, S.; MacMillan, H.; Chick, W. [U]; Bazinet, A. [U]; Hellmann, J.J.; Sinclair, B.J. The effect of variable temperatures on energy use in Lepidoptera. CSZ, Vancouver BC 2010.
1) **Williams, C.M.**; Sinclair, B.J. The effects of continuous and discontinuous gas exchange cycles on CO_2 and H_2O production. SICB, Boston MA 2009.

Invited seminars

University of Florida, Department of Entomology and Nematology, April 2013

University of California, Berkeley, Department of Integrative Biology, Feb 2013

University of North Florida, Department of Biological Sciences, Feb 2013

University of Florida, McGuire Centre for Lepidoptera and Biodiversity, Oct 2012

Florida State University, Department of Biological Sciences, Aug 2012

US Fish and Wildlife Service Conservation Science Webinar Series, July 2012
http://tinyurl.com/cyeqcm2

University of Florida, Department of Entomology and Nematology, Mar 2011

Tyrconnell Heritage Society, Aug 2008

Work History

Dates	Employer	Job title	Job description
2004-2005	GEOS Kodomo, Japan	English instructor	Planned and conducted English lessons for children aged 1-15 years.
2005-2006	Q-Plex Communications, Malaysia	Researcher and script writer	Created natural history documentaries about animals and indigenous people of Malaysia, and a TV show to promote

			science to the general public ("Just Curious", aired on RTM1 in Malaysia October 2007-January 2008).
2005-2006	Kenanga Permai Sdn. Bhd., Malaysia	Founding staff member, writer	Co-founder of a science literacy magazine for teenagers ("NERDS – Nurturing, Exploring, Researching and Developing Science") to encourage scientific literacy in the general population.
2005-2007	Chinese Taipei International School	English instructor	Planned and delivered English lessons for elementary – high school students. Involved in curriculum development and assessment.

Affiliations

- Society of Integrative and Comparative Biology
- Canadian Society of Zoologists
- Australian and New Zealand Society for Comparative Physiology and Biochemistry

Active collaborations

In order of establishment (starting date)
Dr. Jessica Hellmann, ecologist, University of Notre Dame, USA (2007)
Establishing a model system to link summer and winter performance.

Dr. Art Edison, biochemist, University of Florida, USA (2012)
Developing techniques for the automated identification of metabolites in *D. melanogaster*.

Dr. Nishanth Sunny, biomedical physiologist, University of Florida, USA (2012)
Measuring flux through metabolic pathways in *D. melanogaster* and *C. eriphyle*, using stable isotope tracking with NMR spectroscopy.

Dr. Ted Morgan, quantitative geneticist, Kansas State University, USA (2012)
Combining quantitative genetic and physiological approaches to discover important alleles determining cold tolerance in *D. melanogaster*.

Dr. Greg Ragland, computational genomics, University of Notre Dame, USA (2012)
Genetic influences on overwintering energetics of high- and low-altitude *C. eriphyle* butterflies.

Dr. Hugh Henry, community ecologist, University of Western Ontario, Canada (2012)
Biological impacts of winter climate change.

Dr. Thomas Buckley, evolutionary geneticist, Landcare Research and University of Auckland, New Zealand (2012)
Evolution of metabolism in cold-adapted New Zealand stick insects.

Service and Outreach

- **Biology Outreach Committee**, 2008 – 2011. Contributions include initiating and running "Biocafé", a popular drop-in style coffee morning with a home-baking roster, that promoted interactions within the Biology Department.
- Member of **Let's Talk Science** (Canadian nationwide science outreach initiative) 2007 – 2011. Five classroom and community visits per year, where I would run insect-themed activities for children ranging in age from 5-10 years. I developed two new Biology-specific activities, on butterflies and honey bees, that are still in use.
- Assisted in planning and running a "Science Day" for a Grade 6 class at a local school in London Ontario (August 2010).
- Participated in planning and running a Biology "Mini-University" at the University of Western Ontario for First Nations (indigenous) high-school students, to broaden diversity in university-level education (August 2008).
- **International Graduate Students' Issues Committee**, 2008 - 2009. Planning and running events for international graduate students.
- **Peer reviewer** of grant proposals for National Science Centre (Poland), and Texas Academy of Sciences and manuscripts for *Proceedings of the Royal Society B*, *Functional Ecology*, *Ecology*, *Global Change Biology*, *Journal of Evolutionary Biology*, *Integrative and Comparative Biology*, *Physiological and Biochemical Zoology*, *Comparative Biochemistry and Physiology B*, *Physiological Entomology*, *Oikos*, and *Journal of Animal Ecology*.

Media Coverage

Year	Medium	Source(s)
2012	Online	ScienceDaily, Health Canal, Nature World News
	Newspaper	Western News, London Free Press
2010	Online	ScienceDaily, Nature Conservancy Canada webpage
	Newspaper	Western News
2009	Online	Nature Conservancy Canada
	Newspaper	Western News
2008	Online	Tyrconnell Heritage Society
	Newspaper	Western News

Professional Development

"Write Winning Grant Proposals" workshop, full day (19 Mar 2012), Stephen W. Russell and David C. Morrison: The Grant Writer's Seminars and Workshops (www.grantcentral.com). University of Florida Institute for Food and Agriculture Professional Development Series.

UF Postdoctoral Development Workshop – "Everything you wanted to know about becoming a faculty member", 4 Feb 2013.

UF Women in Science and Engineering Initiative panel discussion – "Gender bias in science", 21 Mar 2013.

UF Graduate School workshop – “Cultivating the mentoring relationship with graduate students: conversations with Marianne Schmink”, 15 Apr 2013.