

Curriculum vitae

Jantina Toxopeus

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Summary

I am an assistant professor at St. FX University, where I run a research program on the cell and molecular biology of insect freeze tolerance and teach courses on zoology and cell biology. I have modern pedagogical training and a background in educational development. I am an active member of societies that promote science networking opportunities for early career researchers, including the Canadian Society of Zoologists (CSZ) and Science Atlantic.

Current research funding: CFI (Canadian Foundation for Innovation), NSERC (Natural Sciences and Engineering Research Council), St. FX University

Publications: 17 total peer-reviewed articles, 11 published in the last five years

Publication impact: 332 citations in the last five years, *h*-index: 10 (source: Google Scholar)

Academic Positions

2020-present **Assistant Professor**, *St. Francis Xavier University*, Antigonish, NS

2018-2020 **Postdoctoral Fellow**, *University of Colorado*, Denver, CO
Advisor: Dr. Gregory Ragland

Education

2014-2018 **Ph.D. Biology**, *Western University*, London, ON
Advisor: Dr. Brent Sinclair

2011-2014 **M.Sc. Biology**, *Dalhousie University*, Halifax, NS
Advisor: Dr. Thomas MacRae

2007-2011 **B.Sc. Honours Biology**, *St. Francis Xavier University*, Antigonish, NS
Advisors: Dr. Stephen O'Leary (National Research Council) and Dr. David Garbary

Pedagogical Training

2016 **Instructional Skills Workshop**, *Western University*, London, ON

2015 **Advanced Teaching Program**, *Western University*, London, ON

2011-2013 **Certificate in University Teaching & Learning**, *Dalhousie University*, Halifax, NS

Awards and Recognitions

Research

- 2019 Dr. John W. Arnold Fellowship, *Western University Biology* (1,300 CAD)
awarded for the best Ph.D. thesis in Biology
- 2017 Megan J. Davey Ontario Graduate Scholarship (OGS), *Western U.* (15,000 CAD),
awarded to top applicant researching in the life sciences at Western University
- 2014 Canada Graduate Scholarship-Doctoral, *NSERC (Natural Sciences and Engineering
Research Council of Canada)* (105,000 CAD)
- 2012 Izaak Walton Killam Memorial Scholarship, *Dalhousie University* (20,000 CAD)
- 2011 Julie Payette Award, *NSERC*, (25,000 CAD),
one of the top 25 recipients of NSERC M.Sc. scholarship funding
- 2009, 2010 Undergraduate Student Research Award, *NSERC* (2 x 4,500 CAD)

Research Communication

- 2020 Best Seminar Presentation, *University of Colorado Postdoctoral Association*
- 2020 Finalist for Presidents' Award (best post-doc talk), *Canadian Society of Zoologists*
- 2014 Finalist for Hoar Award (best student talk), *Canadian Society of Zoologists*
- 2013 Best Oral Presentation, *Dalhousie University Patrick Lett Symposium*

Teaching

- 2017 Inducted into Teacher Hall of Fame, *The Princeton Review*
- 2016 Nominated for Teaching Assistant Award, *Western U. Society of Graduate Students*

Service

Committees

Department-Level

2020-present **Science Atlantic - Biology**, *St. FX Biology Department Representative*
 Represent St. FX University at meetings of this regional organization that plans conferences for undergraduate students in Atlantic Canada. Report to the Biology department at St. FX on any pertinent developments and events.

University-Level

2021-2023 **University Council for Research**, *Member*
 Evaluate applications for sabbatical and internal grant funding at St. FX University.

2021 **Evaluation Committee for Undergraduate Summer Research Awards**, *Member*
 Evaluated approximately 50 student applications for summer research funding in the Faculty of Science in this ad-hoc committee at St. FX University.

Professional Societies

2021-2024 **Canadian Society of Zoologists (CSZ)**, *Regular Councillor*
 Elected by popular vote to represent member views at biannual council meetings. Contribute to committees and initiatives related to zoology research in Canada.

Outreach

2021 **Media Coverage**
 Interview with 989 XFM (local radio) on my research program at St. FX (prompted by media release of CFI JELF grant results).

2020 **Women in Science and Engineering (WiSE) Atlantic**, *Panelist*
 Contributed to panel discussions on job market strategies for postdoctoral fellows at WiSE Atlantic's "Stepping Forward" workshop for women.

2020 **St. FX Biology Department, Furious Threes**, *Presenter*
 Research recruitment event targeted at Biology undergraduates at St. FX.

2020 **St. FX Diversity Engagement Centre, Research BINGO**, *Presenter*
 Research recruitment event targeted at undergraduates from groups that are historically underrepresented in research.

Peer Review

Academic Journals

Conducted peer-review for manuscripts from 17 journals

Agricultural and Forest Entomology	Functional Ecology
Austral Entomology	Journal of Economic Entomology
BMC Biology	Journal of Experimental Biology
The Canadian Entomologist	Journal of Insect Physiology
Cell Stress and Chaperones	Journal of Integrative Agriculture
Comparative Biochemistry and Physiology	Journal of Thermal Biology
Conservation Physiology	Oecologia
Environmental Entomology	Scientific Reports
European Journal of Entomology	

Research Grants

External reviewer for research grants from 2 agencies

Canadian Food Inspection Agency (CFIA)	Marsden Foundation (New Zealand)
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Teaching and Educational Leadership

Courses Taught

St. Francis Xavier University, Antigonish NS

2021-present **Coordinator of Students** (co-taught with Dr. Wyeth); fall and winter semesters. Coordination and delivery of core Biology Honours Courses (Biol 475, 493), and non-credit courses Biol 391 (Junior Seminar), Biol 491 (Senior Seminar)

2020-present **Introductory Cell Biology** (Biol 111); fall semester, 3 lectures/week, ~75 students
Animal Biology (Biol 201); winter semester, 3 lectures/week, ~75 students
Advanced Cell Biology (Biol 395); winter semester, 3 lectures and 1 lab/week, ~12 students

The Princeton Review, Halifax, NS and London, ON

2013-2018 **MCAT Biology**; taught 12 sections over 5 years. 30-33 h of lectures over a 10 week period, covering biochemistry, molecular biology, genetics, cell biology, microbiology, and human physiology

Dalhousie University, Halifax, NS

2014 **Evolution** (Biol 2040); winter semester, 3 lectures/week, ~175 students

Acadia University, Wolfville, NS

2013 **Principles of Development** (Biol 3153); fall semester, 3 lectures and 1 lab/week, ~12 students. Developed two new labs.

Scholarship of Teaching and Learning

Refereed Conference Presentations

1. **Toxopeus, J.** and Sinclair B.J. (2017) Thinking like scientist: strategies to measure and improve knowledge structures of biology students. *Western Conference on Science Education (WCSE)*, London, ON. [oral] [national]
 - Also presented at the Western University *Research on Teaching and Learning Symposium*

Non-Refereed Publications

1. **Toxopeus, J.** (2013) Undergraduate laboratories: What are we teaching? *Dalhousie Centre for Learning and Teaching FOCUS Newsletter*, 21(2): 7-8.

Educational Leadership

Short Courses Taught

The Princeton Review, Toronto, ON

2015-2020 **MCAT Biology Training – Facilitator**

- Trained new instructors to teach the biology component of a course for students intending to write the Medical College Admission Test (MCAT)

Western University Centre for Teaching and Learning, London, ON

2016-2018 **Teaching Assistant Training Program – Facilitator**

- Topics included best teaching practises for graduate teaching assistants (e.g. effective lesson design, facilitating laboratories, interpersonal communication)

Education Workshops Developed

4. Help, I have to TA! (2016, 2017) Western University, *Biology Graduate Student Orientation*
3. Effective TAing: Challenges and solutions (2016) Canadian Society of Zoologists (CSZ), *Annual Meeting*
2. Thinking like a scientist: Incorporating authentic scientific inquiry into laboratory courses (2015) *Advanced Teaching Program Capstone Project*
1. Teaching in the lab: Making the most of your experience (2012) Dalhousie University, *TA Professional Development Days*

Invited Panel Presentations

4. Assessing student learning (2018) Western University, *Spring Conference on Teaching for Graduate Students*
3. Networking at academic conferences (2017) Western University, *Academic and Professional Communication Day*
2. Zoology education in Canada: Current state, changes and moving forward (2017) Canadian Society of Zoologists, *Annual Meeting*
1. Thriving as a TA: Panel of outstanding TAs (2016) Western University, *TA Day Graduate Conference on Teaching*

Research Activities

Research Grants

Current Research Funding

- 2021-2026 Discovery Grant and Discovery Launch Supplement, *NSERC – Natural Sciences and Engineering Research Council of Canada* (177,500 CAD)
Project: The cellular mechanisms of insect physiological plasticity and freeze tolerance
- 2021-2023 University Council for Research Grant, *St. FX University* (7,000 CAD)
Project: Cell biology of insect freeze tolerance
- 2021-2022 John Evans Leaders Fund, *Canadian Foundation for Innovation* (172,600 CAD)
Project: Atlantic Canadian Centre for Biology of Overwintering Insects
- 2020-2025 Start-Up Funding, *St. FX University* (27,000 CAD)
- 2020-2021 John Evans Leaders Fund, *Canadian Foundation for Innovation* (440,000 CAD)
Project: Laser scanning confocal microscope for cellular studies of biofouling, neuroanatomy, symbiosis and freeze tolerance
Co-applicants: Dr. Russell Wyeth, Dr. Cory Bishop (St. FX University)

Past Research Funding

- 2020-2021 Nova Scotia COVID-19 Health Research, *Research Nova Scotia* (67,500 CAD)
Project: Wastewater Surveillance of SARS-CoV-2 in Nova Scotia
Co-applicants: Dr. Russell Wyeth, Dr. Tammy Rodela (St. FX University)
Collaborators: Dr. Graham Gagnon, Dr. Amina Stoddart (PIs; Dalhousie U.), Dr. Jennie Rand (Acadia U.), Dr. Allison Mackie (Cape Breton U.)

Research Mentoring

All named trainees below conducted independent research projects

Supervision and Co-supervision

Undergraduate Students

- 2021-2022 Victoria Adams, *B.Sc. Honours* (McLachlan Award)
 Trinity McIntyre, *B.Sc. Advanced Major* (Chiasson Award)
 Jay Turnsek, *B.Sc. Honours* (with Dr. Hughes; Ally Heaps Award)
 Maranda van Oirschot, *B.Sc. Major* (with Dr. Marshall; McLachlan Award)

Research Assistants

- 2020-2021 Katherine Rutherford, *Technician* (with Drs. Wyeth and Rodela)

Advisory CommitteesGraduate Students

2019-2021 Lahari Gadey, *M.S. Biology* (University of Colorado Denver)

Undergraduate Students

2020-2021 Amy Dodge, *B.Sc. Honours*
Benjamin Fisher, *B.Sc. Honours*

Informal Co-supervision as a Graduate Student/Post-docUndergraduate Students

2019-2020 Lalitya Andaloori, *B.S. Major* (with Dr. Ragland at UC Denver)
Joseph Tucker, *B.S. Major* (with Dr. Ragland at UC Denver)
2018-2020 Matin Sanaei, *B.S. Major* (with Dr. Ragland at UC Denver)
2017-2018 Kendra Corral, *MITACs Exchange Student* (with Dr. Sinclair at Western U)
Aisa Kuper-Psenicnik, *B.Sc. Honours* (with Dr. Sinclair at Western U)
2015-2016 Claire Newman, *B.Sc. Honours* (with Dr. Percival-Smith at Western U)

I also directly supervised 23 undergraduate lab assistants (volunteers or work-study students) during my Ph.D. at Western University, and 6 undergraduate lab assistants at the University of Colorado, Denver.

Current Professional Affiliations

Canadian Society of Zoologists (2014-present), Entomological Society of America (2018-present), Society for Experimental Biology (2015-present), Society for Integrative and Comparative Biology (2017-present)

Peer-Reviewed Publications

17 total, *h-index=10*, 356 citations since 2016 (source: Google Scholar); trainees underlined.

17. **Toxopeus, J.**, Gadey, L., Andaloori, L., Sanaei, M. and Ragland, G. (2021) Costs of averting or prematurely terminating diapause associated with slow decline of metabolic rates at low temperature. *Comparative Biochemistry and Physiology A*, 255: 110920.
16. Lebenzon, J.E., **Toxopeus, J.**, Anthony, S.E. and Sinclair B.J. (2021) *De novo* assembly and characterisation of the transcriptome of the Beringian pseudoscorpion. *The Canadian Entomologist*, 153: 301-313.
15. Li, N.G., **Toxopeus, J.**, Moos, M., Sørensen, J.G. and Sinclair, B.J. (2020) A comparison of low temperature biology of *Pieris rapae* from Ontario, Canada, and Yakutia, Far Eastern Russia. *Comparative Biochemistry and Physiology A*, 242: 110649.
14. Rozsypal, J., **Toxopeus, J.**, Berková, P., Moos, M., Šimek, P. and Košťál, V. (2019) Fat body disintegration after freezing stress is a consequence rather than cause of freezing injury in larvae of *Drosophila melanogaster*. *Journal of Insect Physiology*, 115: 12-19.

13. **Toxopeus, J.**, Košťál, V. and Sinclair, B.J. (2019) Evidence for non-colligative function of small cryoprotectants in a freeze tolerant insect. *Proceedings of the Royal Society B*, 286: 20190050. ****Featured twice on CBC Radio (on "Fresh Air" and "All in a Day"), recommended in F1000Prime.**
12. **Toxopeus, J.**, Des Marteaux, L.E. and Sinclair, B.J. (2019) How crickets become freeze-tolerant: the transcriptomic underpinnings of acclimation in *Gryllus veletis*. *Comparative Biochemistry and Physiology D*, 29: 55-66.
11. **Toxopeus, J.**, McKinnon, A.H., Štětina, T., Turnbull, K.F. and Sinclair, B.J. (2019) Laboratory acclimation to autumn-like conditions induces freeze tolerance in the spring field cricket *Gryllus veletis* (Orthoptera: Gryllidae). *Journal of Insect Physiology*, 113: 9-16.
10. **Toxopeus, J.** and Sinclair, B.J. (2018) Mechanisms underlying insect freeze tolerance. *Biological Reviews*, 93: 1891-1914.
9. Newman, C.E., **Toxopeus, J.**, Udaka, H., Ahn, S., Martynowicz, D.M., Graether, S.P., Sinclair, B.J. and Percival-Smith, A. (2017) CRISPR-induced null alleles show that *Frost* protects *Drosophila melanogaster* reproduction after cold exposure. *Journal of Experimental Biology*, 220: 3344-3354.
8. Des Marteaux, L.E., McKinnon, A.H., Udaka, H., **Toxopeus, J.** and Sinclair, B.J. (2017) Effects of cold-acclimation on gene expression in Fall field cricket (*Gryllus pennsylvanicus*) ionoregulatory tissues. *BMC Genomics*, 18: 357.
7. Andrushchenko, I.V., Taylor, B.R., **Toxopeus, J.** and Wilson, E. (2017) Congregations of the leaf-shredding insect *Lepidostoma togatum* mediate exceptionally rapid mass loss from leaf litter in Nova Scotia rivers. *Hydrobiologia*, 78:245-265. [authors in alphabetical order]
6. **Toxopeus, J.**, Lebenzon, J.E., McKinnon, A.H. and Sinclair B.J. (2016) Freeze tolerance of *Cyphoderris montrosa* (Orthoptera: Prophalangopsidae). *The Canadian Entomologist*, 148: 668-672.
5. **Toxopeus, J.**, Jakobs, R., Ferguson, L.V., Garipey, T.D. and Sinclair, B.J. (2016) Reproductive arrest and stress resistance in winter-acclimated *Drosophila suzukii*. *Journal of Insect Physiology*, 89: 37-51.
4. **Toxopeus, J.**, Warner, A.H. and MacRae, T.H. (2014) Group 1 LEA proteins contribute to the desiccation and freeze tolerance of *Artemia franciscana* embryos. *Cell Stress & Chaperones*, 19: 939-948.
3. King, A.M., **Toxopeus, J.** and MacRae, T.H. (2014) Artemin, a diapause-specific chaperone, contributes to stress tolerance of *Artemia* cysts and influences their release from females. *Journal of Experimental Biology*, 217: 1719-1724.
2. King, A.M., **Toxopeus, J.** and MacRae, T.H. (2013) Functional differentiation of small heat shock proteins in diapause-destined *Artemia* embryos. *FEBS Journal*, 280: 4761-4772.
1. **Toxopeus, J.**, Kozera, C.J., O'Leary, S.J.B. and Garbary, D.J. (2011) A reclassification of *Mycophycias ascophylli* (Ascomycota) based on nuclear large ribosomal subunit DNA sequences. *Botanica Marina*, 54: 325-334.

Book Chapters

1. Garbary, D.J., Brown, N.E., MacDonell, H.J., and **Toxopeus, J.** (2017) *Ascophyllum* and its symbionts – a complex symbiotic community on North Atlantic shores. Edited by M. Grube, J. Sechback, L. Muggia, *In Algal and Cyanobacteria Symbiosis*. World Scientific Publishing Europe Ltd.: Hackensack, NJ, USA. pp. 547-572.

Invited Talks

Seminars

1. **Toxopeus, J.** (2020) How to freeze solid and live to tell the tale: Advice from the insect world. *Mount Allison University [Chemistry and Biochemistry Seminar Series]*. Sackville, NB.

Conference Symposia

1. **Toxopeus, J.** (2020*) The role of cryoprotectants in insect freeze tolerance: lessons from crickets, butterflies, and other animals. *Physiological Responses to Environmental Stress Symposium [International Congress of Entomology]*. Helsinki, Finland.

* postponed to 2022 due to COVID

Invited Talks as a Graduate Student/Post-doc

3. **Toxopeus, J.** (2020) Challenging the hallmarks of insect diapause: A case study in *Rhagoletis pomonella*. *University of Colorado Denver [Integrative Biology Seminar Series]*, Denver, CO.
2. **Toxopeus, J.** and Sinclair B.J. (2018) Life in the frozen lane: *Gryllus veletis* as an emerging model for insect freeze tolerance. *Orthopteroids: Small Orders, Big Ideas [Entomological Society of America Annual Meeting]*. Vancouver, BC.
1. **Toxopeus, J.** (2016) Uncovering the mechanisms underlying insect freeze tolerance. *Czech Academy of Science [Physiology Seminar Series]*, České Budějovice, Czechia.

Conference Presentations

17 total with *Toxopeus* as presenting author; trainees underlined

17. **Toxopeus, J.**, Gadey, L., Andaloori, L., Sanaei, M. and Ragland, G.J. (2021) Costs of averting diapause associated with slow decline of metabolic rates at low temperature in the apple maggot fly *Rhagoletis pomonella*. *Society for Integrative and Comparative Biology (SICB) Annual Meeting*. Virtual. [oral] [international]
16. **Toxopeus, J.**, Dowle, E.J and Ragland, G.J. (2020) Challenging the hallmarks of insect diapause: A case study in *Rhagoletis pomonella*. *Canadian Society of Zoologists (CSZ) Annual Meeting*. Virtual. [oral] [national]
15. **Toxopeus, J.**, Dowle, E.J. and Ragland, G.J. (2020) Tracking physiological time: Timing and duration of cold exposure impacts seasonal life history timing in a temperate insect. *SICB Annual Meeting*. Austin, TX. [oral] [international]

14. **Toxopeus, J.** and Ragland, G.J. (2019) Do mechanisms of cold tolerance change with development? A case study using RNA interference of multiple genes in *Drosophila melanogaster*. *International Symposium on the Environmental Physiology of Ectotherms and Plants (ISEPEP)* 8. Buenos Aires, Argentina. [oral] [international]
13. **Toxopeus, J.**, Dowle, E.J. and Ragland, G.J. (2019) Development and thermal sensitivity of the apple maggot fly (*Rhagoletis pomonella*): Implications for overwintering ecology. *CSZ Annual Meeting*. Windsor, ON. [oral] [national]
12. **Toxopeus, J.**, Des Marteaux, L.E., Košťál, V. and Sinclair, B.J. (2018) Do cryoprotectants really protect against cold? An experimental evaluation of insect freeze tolerance. *CSZ Annual Meeting*, St. John's, NL. [oral] [national]
11. **Toxopeus, J.**, Des Marteaux, L.E., Košťál, V. and Sinclair B.J. (2018) Why frozen insects die: a tale of metabolomics, transcriptomics and cryoprotectant manipulation in freeze-tolerant crickets. *SICB Annual Meeting*. San Francisco, CA. [oral] [international]
10. **Toxopeus, J.**, Košťál, V. and Sinclair B.J. (2017) Manipulating the transcriptome and metabolome of the spring field cricket, *Gryllus veletis*. *ISEPEP 7*, Tartu, Estonia. [oral] [international]
9. **Toxopeus, J.** and Sinclair B.J. (2017) Thinking like scientist: strategies to measure and improve knowledge structures of biology students. *Western Conference on Science Education (WCSE)*, London, ON. [oral] [national]
8. **Toxopeus, J.**, Košťál, V. and Sinclair B.J. (2017) Functional assessment of cryoprotectants in the freeze-tolerant spring field cricket, *Gryllus veletis*. *CSZ Annual Meeting*, Winnipeg, MB. [oral] [national]
7. **Toxopeus, J.**, Košťál, V. & Sinclair B.J. (2017) Metabolomics and transcriptomics of freeze tolerance acclimation in *Gryllus veletis*. *SICB Annual Meeting*, New Orleans, LA. [poster] [international]
6. **Toxopeus, J.**, Košťál, V. and Sinclair B.J. (2016) Crickets on ice: dissecting the mechanisms underlying insect freeze tolerance. *CSZ Annual Meeting*, London, ON. [poster] [national]
5. **Toxopeus, J.**, Jakobs, R., Ferguson, L.V., Garipey, T.D. and Sinclair, B.J. (2015) Reproductive diapause alters stress tolerance in *Drosophila suzukii*. *CSZ Annual Meeting*, Calgary, AB. [poster] [national]
4. **Toxopeus, J.**, Warner, A.H. and MacRae, T.H. (2014) Group 1 Late Embryogenesis Abundant (LEA) proteins enhance desiccation and freeze tolerance of the crustacean, *Artemia franciscana*. *CSZ Annual Meeting*, Montreal, QC. [oral] [national]
3. King, A.M., **Toxopeus, J.** and MacRae, T.H. (2013) Functional differentiation of small heat shock proteins in diapause embryos of *Artemia franciscana*. *ISEPEP 5*, London, ON. [oral] [international]
2. **Toxopeus, J.**, Warner, A.H. and MacRae, T.H. (2013) Life without water: the importance of Late Embryogenesis Abundant (LEA) proteins in a stress-tolerant crustacean. *Dalhousie University Patrick Lett Symposium*, Halifax, NS. [oral] [institutional]

1. **Toxopeus, J.**, Kozera, C.J., O’Leary, S.J.B. and Garbary, D.J. (2011) Classification of *Mycophycias ascophylli*, a marine fungus associated with two brown algae. *APICS Undergraduate Biology Conference*, Halifax, NS. [poster] [regional]