Carolyn T. Chang Ph.D.

Molecular Biosciences Research Group
Texas State University
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San Marcos, TX 78666
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EDUCATION

2017 **Ph.D. Fish and Wildlife Biology & Management**
State University of New York College of Environmental Science & Forestry
Syracuse, NY, USA
Area of Specialization: Mycobacterial disease in laboratory zebrafish

2013 **M.Sc. Applied Science**
Saint Mary's University
Halifax, NS, Canada
Area of Specialization: Craniofacial development in zebrafish.

2010 **B.Sc. Honours Science, Biology Minor**
University of Waterloo
Waterloo, ON, Canada

UNIVERSITY EXPERIENCE

Program Faculty: South Texas Bridge Program Coordinator, Molecular Biosciences Research Group, Texas State University, Sept 2019 – present

- Program Coordinator for the South Texas Doctoral Bridge program, an NIH-funded Bridge to Doctorate Training Program. Works in collaboration with the principal investigators, leading programmatic needs of the training program at Texas State University.

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Postdoctoral Researcher: Thune Lab, Department of Pathobiological Sciences, Louisiana State University School of Veterinary Medicine, February 2018-September 2019

- Investigating host-pathogen interactions of enteric septicemia of catfish (*Ictalurus punctatus*) caused by *Edwardsiella ictaluri* at the molecular level using *in vitro* and *in vivo* modelling, molecular bacteriology, and immunological techniques.

Research Project Assistant: Whipps Fish and Wildlife Disease Lab, Department of Environment and Forest Biology, SUNY-ESF – State University of New York College of Environmental Science and Forestry, 2014-2017

- Investigating mycobacteriosis in laboratory zebrafish (*Danio rerio)* using both *in vitro* and *in vivo* modelling, molecular diagnostics, bacterial culture, and histological techniques.

Research Technician: Rand Lab, Department of Biology, Saint Mary's University, Fall 2013

- *In vitro* study of murine macrophage cytokine expression following exposure to fungal metabolite isolates using ELISA analysis.

Masters Researcher: Franz-Odendaal Bone Development Lab, Department of Biology, Mount Saint Vincent University, 2011-2013

- *In vivo* analyses of the growth and development of the zebrafish craniofacial bones and sensory system using laser ablation and histological analyses.

Undergraduate Honors Research: Semple Lab, Department of Biology, University of Waterloo, 2009-2010

- Cladistical analysis of morphological characters of the goldenrod genus *Solidago* L.

RESEARCH FUNDING

2019 AFRI Competitive Grant (Co-PI), United States Department of Agriculture
Louisiana State University School of Veterinary Medicine ($500,000 USD)

2016 Doctoral Postgraduate Scholarship, National Sciences and Engineering ($42,000 CAD)

2011 Ontario Graduate Scholarship, Government of Ontario (declined)

PUBLICATIONS

Chang, C.T., Benedict S. Whipps, C.M. (2019) Investigating transmission of *Mycobacterium chelonae* and *Mycobacterium marinum* in laboratory zebrafish through three live feeds. *Journal of Fish Diseases*. 16 August 2019 https://doi.org/10.1111/jfd.13071

Chang, C.T., Lewis, J.L., Whipps, C.M. (2019) Source or Sink: Examining the Role of Biofilms in Transmission of Mycobacterium spp. in Laboratory Zebrafish. *Zebrafish* DOI: 10.1089/zeb.2018.1689

Rand, T.G., **Chang, C.T.**, McMullin, D.R., and J.D. Miller. (2017) Inflammation-associated gene expression in RAW 264.7 macrophages induced by toxins from fungi common on damp building materials. *Toxicology In Vitro* 43: 16-20.

Chang, C.T., Doerr, K.M., and Whipps, C.M. (2017) Antibiotic treatment of zebrafish mycobacteriosis: tolerance and efficacy of treatment with tigecycline and clarithromycin. *Journal of Fish Diseases*. DOI: 10.1111/jfd.12619

Chang, C.T., Amack, J.D., and Whipps, C.M. (2016) Zebrafish embryo disinfection with povidone iodine: evaluating an alternative to chlorine bleach. *Zebrafish* 13(S1): S96-S101.

Chang, C.T., Colicino, E.G., DiPaola, E.J., Al-Hasnawi, H. J., and Whipps, C.M. (2015) Evaluating the effectiveness of common disinfectants at preventing the propagation of

Mycobacterium spp. isolated from zebrafish. *Comparative Biochemistry and Physiology – Part C: Toxicology and Pharmacology* 178: 45-50.

Chang, C. T., and Whipps, C.M. (2015) Activity of antibiotics against Mycobacterium spp. commonly found in laboratory zebrafish. *Journal of Aquatic Animal Health* 27 (2): 88-95.

Chang, C.T., and Franz-Odendaal, T.A. (2014) Perturbing the developing skull: Using laser ablation to investigate the robustness of the infraorbital bones in the zebrafish (*Danio rerio*). *BMC Developmental Biology* 14(44): 1-13.

Chang, C., and Franz-Odendaal, T.A. (2014) The zebrafish infraorbital bones: a descriptive study. *Zebrafish* 11(1): 50-56.

AWARDS & HONORS

2017 Spotlight on Student Research First Place Presentation, SUNY-ESF ($100 USD)
2017 Best Student Paper, American Fisheries Society Fish Health Section ($200)
2017 Best Student Poster, American Fisheries Society Fish Health Section ($200)
2017 Snieszko Student Travel Award, American Fisheries Society ($674 USD)
2017 Alumni Association Memorial Scholarship, SUNY-ESF ($1,200 USD)
2017 Graduate Student Travel Grant, SUNY-ESF ($500 USD)
2017 Tuition Scholarship, SUNY-ESF
2016 Alumni Association Memorial Scholarship, SUNY-ESF ($1,200 USD)
2016 Graduate Student Travel Grant, SUNY-ESF ($500 USD)
2016 Tuition Scholarship, SUNY-ESF
2015 Fish Health Section Best Student Paper, American Fisheries Society ($100 USD)
2015 Snieszko Student Travel Award, American Fisheries Society ($565 USD)
2015 Graduate Student Association Travel Grant, SUNY-ESF ($250 USD)
2015 Spotlight on Student Research First Place Presentation, SUNY-ESF ($150 USD)
2015 3-Minute Thesis Competition Bracket Winner, Syracuse University
2015 Tuition Scholarship, SUNY-ESF
2014 Tuition Scholarship, SUNY-ESF
2012-2013 Faculty of Graduate Studies and Research Award, Saint Mary's University
2011-2013 Faculty of Graduate Studies and Research Fellow, Saint Mary's University

CONFERENCE ACTIVITY

March 9, 2019, Aquaculture 2019, New Orleans, LA. Transmission of *Mycobacterium* spp. To zebrafish through three live feeds. **Chang, C.T.,** Benedict, S., Whipps, C.M. [oral]

March 9, 2019, Aquaculture 2019, New Orleans, LA. Evaluating the role of surface biofilms in the transmission of *Mycobacterium* species in laboratory zebrafish. Whipps, C.M, **Chang, C.T.** [oral]

March 8, 2019, Aquaculture 2019, New Orleans, LA. Understanding the role of the *Edwardsiella ictalurid* T3SS effector proteins for virulence in channel catfish *Ictalurus punctatus*. **Chang, C. T.**, and Thune, R. [oral]

April 25, 2017. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Can strain typing help us understand *Mycobacterium marinum* outbreaks at zebrafish research facilities? **Chang, C.T.**, Clemons, B.M., Whipps, C.M [Poster]

April 3, 2017. American Fisheries Society Fish Health Section / Great Lakes Fishery Consortium Fish Health Committee Joint Meeting, Lansing, MI. Tolerance and efficacy of tigecycline and clarithromycin for the treatment of mycobacteriosis in laboratory zebrafish. **Chang, C.T.**, Doerr, K.M., Whipps, C.M [Oral]

April 2, 2017. American Fisheries Society Fish Health Section / Great Lakes Fishery Consortium Fish Health Committee Joint Meeting, Lansing, MI. Can strain typing help us understand *Mycobacterium marinum* outbreaks at zebrafish research facilities? **Chang, C.T.**, Clemons, B.M., Whipps, C.M [Poster]

February 21, 2017. Aquaculture America, San Antonio, TX. Tolerance and efficacy of antibiotic treatments of zebrafish mycobacteriosis. **Chang, C.T.**, Doerr, K.M., Whipps, C.M [Oral]

December 9, 2016. Mid-Atlantic Regional Zebrafish Meeting, National Institutes of Health, Bethesda, MD. Preventing mycobacteriosis in zebrafish colonies through embryo disinfection. **Chang, C.T.**, Whipps, C.M. [Poster]

April 19, 2016. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Antibiotic treatment of zebrafish mycobacteriosis: efficacy of treatment with tigecycline and clarithromycin. **Chang, C.T.**, Doerr, K.M., Whipps, C.M. [Poster]

April 19, 2016. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Investigating tolerance, growth, and fecundity of laboratory zebrafish (*Danio rerio*) clarithromycin and tigecycline antibiotics. Doerr, K.M., **Chang, C.T.**, Whipps, C.M. [Poster]

April 19, 2016. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Investigating transmission of *Mycobacterium* spp. from experimentally infected zebrafish (*Danio rerio*) to tank biofilms. Adler, A., **Chang, C.T.**, Whipps, C.M. [Poster]

February 23-26, 2016. Aquaculture America, Las Vegas, NV. Zebrafish embryo disinfection with povidone iodine: evaluating an alternative to chlorine bleach. **Chang, C.T.**, Amack, J.D., Whipps, C.M. [Oral]

July 13-15, 2015. American Fisheries Society Fish Health Section Annual Meeting, Ithaca, NY. Toxicity of iodine to zebrafish embryos, an alternative to chlorine disinfection for preventing mycobacterial spread. **Chang, C.T.**, Amack, J.D., Whipps, C.M. [Oral]

April 15-16, 2015. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Investigating the effectiveness of disinfectant treatments for inhibiting the growth of *Mycobacterium* spp. isolated from laboratory zebrafish (*Danio rerio*). **Chang, C.T.**, Colicino, E.G., DiPaola, E.J., Chen, T., Al-Hasnawi, H.J., Whipps, C.M. [Poster]

April 15-16, 2015. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Strain typing *Mycobacterium marinum* from outbreaks at zebrafish research facilities. Clemons, B.M., **Chang, C.T.**, Whipps, C.M. [Poster]

December 13-18, 2014. The 7th Aquatic Animal Models of Human Disease Conference, Austin, TX.) Investigating the effectiveness of disinfectant treatments for inhibiting the growth of *Mycobacterium* spp. isolated from laboratory zebrafish (*Danio rerio*). **Chang, C.T.**, Whipps, C.M. [Poster]

August 31-September 5, 2014. Seventh International Symposium on Aquatic Animal Health, Portland, OR. Activity of antibiotics against *Mycobacterium* spp. commonly found in zebrafish. **Chang, C.T.**, Whipps, C.M. [Oral]

May 25-29, 2014. Genomes to Biomes, Montreal, QC. Skull development in zebrafish: tracking skeletogenic condensations. **Chang, C.**, Jabalee, J., Franz-Odendaal, T.A. [Poster]

April 15-16, 2014. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Fishy infections: investigating mycobacteriosis in laboratory zebrafish. **Chang, C.T.**, Whipps, C.M. [Poster]

April 15-16, 2014. SUNY-ESF Spotlight on Student Research, Syracuse, NY. Analysis of disinfectants on *Mycobacterium* spp. Colicino, E.G., DiPaolo, E.J., **Chang, C.T.**, Whipps, C.M. [Poster]

April 15-16, 2014. SUNY-ESF Spotlight on Student Research, Syracuse, NY. The effect of bleach and hydrogen peroxide on *Mycobacterium* species. DiPaolo, E.J., Colicino, E.G., **Chang, C.T.**, Whipps, C.M. [Poster]

July 9-13, 2013. The 8th European Zebrafish Meeting, Barcelona, Spain. Testing developmental resilience through targeted laser ablation of zebrafish infraorbital bones. **Chang, C.**, Franz-Odendaal, T.A. [Poster]

May 13-17, 2013. Canadian Society of Zoologists Annual Meeting, Guelph, ON. Perturbing the developing skull: Using laser ablation to investigate the robustness of the infraorbital bones. **Chang, C.**, Franz-Odendaal, T.A. [Oral]

January 3-7, 2013. Society of Integrative and Comparative Biology Annual Meeting, San Francisco, CA. Condensations to mineralizations: the development of the zebrafish (*Danio rerio*) infraorbital bones. **Chang, C.**, Franz-Odendaal, T.A. [Poster]

May 7-11, 2012. Canadian Society of Zoologists Annual Meeting, Sackville, NS. Investigating the developmental morphogenesis of the zebrafish (*Danio rerio*) infraorbital bones. **Chang, C.**, Franz-Odendaal, T.A. [Poster]

TEACHING EXPERIENCE

Courses Taught

State University of New York College of Environmental Science and Forestry
Microbial Pathogenesis & Host Defenses Seminar, Co-Instructor (Spring 2016)

Saint Mary's University
Human Organ Systems, Teaching Assistant (Fall 2012, Fall 2013)
Animal Tissues, Teaching Assistant (Spring 2013)
Molecular and Cell Biology, Teaching Assistant (Fall 2011, Fall 2012)
Organismal and Ecological Biology, Teaching Assistant (Spring 2012)
Animal Development, Teaching Assistant (Fall 2011)

Directed Student Learning

State University of New York College of Environmental Science and Forestry
Research Problems in Biotechnology, Co-Supervisor (Spring 2014-2017, Fall 2016)
Internship in Biotechnology, Co-Supervisor (Summer 2015, Fall 2016)
Research Apprenticeships in Biotechnology, Co-Supervisor (Fall 2015)

Other

Session Instructor, SUNY-ESF Smart Scholars Biotechnology Week (High School), 2014
Build a Better Poster! Scientific Poster-making Workshop, SUNY-ESF, April 2, 2016

SERVICE

Institutional

Judge, LSU Discover Day Undergraduate Research Symposium April 10, 2018
SUNY-ESF Academic Governance Research Committee, 2016-2017
Graduate Student Orientation Volunteer, SUNY-ESF, Spring 2017
Graduate Student Orientation Volunteer, SUNY-ESF, Fall 2016
Judge, SUNY-ESF Spotlight on Student Research, 2015

Departmental

Session Chair, LSU SVM Department of Pathobiological Sciences Symposium, May 7, 2019
Biology Faculty Search Graduate Student Committee, SUNY-ESF, Spring 2015 & 2016

Professional

Manuscript Reviewer: Journal of Fish Diseases, Journal of Aquatic Animal Health, North American Journal of Aquaculture, Aquaculture, PLOS ONE
Session Chair, Warm Water Bacterial Pathogens, Aquaculture 2019, New Orleans, LA.
Treasurer, SUNY-ESF Chapter of the American Fisheries Society, 2016-2017.
Volunteer, 7th Aquatic Animal Models of Human Disease Conference, 2014

Community

Mentor, Global Stem Alliance 1000 Girls 1000 Futures Program, 2015-2016
Volunteer, NSERC Women in Science and Engineering Girls Get WISE Camp, 2012
Session Organizer, NSERC Women in Science and Engineering WISE Day, 2012
Volunteer, NSERC Women in Science and Engineering School Visits, 2011-2012
Mentor, Techsploration Goes to School, 2011-2012