

# CURRICULUM VITAE

Gregory J. Crowther, Ph.D.

Email: [gcrowther@everettcc.edu](mailto:gcrowther@everettcc.edu) / Phone: 425-388-9480

Website: <https://faculty.washington.edu/crowther/>

## Appointments

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- 2018- Instructor (Life Sciences), Everett Community College (WA)
- 2014- Lecturer/Affiliate Instructor (Biological Sciences), University of Washington Bothell
- 2008-2014 Acting Faculty (Biology, English, and Medicine), University of Washington (Seattle)
- 2002-2003 Visiting Assistant Professor (Biology), University of Puget Sound (Tacoma, WA)

## Education and training

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- 2016-2017 M.A. in Teaching (Science Education), Western Governors University
- Adviser: Carla Phillips, M.Ed.
- 2003-2007 Postdoctoral fellowship in Chemical Engineering/Microbiology, University of Washington (Seattle)
- Adviser: Mary E. Lidstrom, Ph.D.
- 1995-2002 Ph.D. in Physiology & Biophysics, University of Washington (Seattle)
- Advisers: Kevin E. Conley, Ph.D., and Martin J. Kushmerick, M.D., Ph.D.
- 1991-1995 B.A. in Biology, Williams College (Williamstown, MA)
- Adviser: Daniel V. Lynch, Ph.D.

## Teaching

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- 2018- Everett Community College (WA)
- Biology 231: Human Anatomy
  - Biology 232: Human Physiology
- 2014-2019 University of Washington Bothell
- Biology 180: Introductory Biology (labs only)
  - Biology 241-242: Human Anatomy & Physiology
  - Biology 351-352: Principles of Anatomy & Physiology
  - Biology 498: Independent Study in Biology
  - Biology 499: Undergraduate Research in Biology
- 2014-2015 South Seattle College (WA)
- Biology 241: Human Anatomy & Physiology
- 2003-2014 University of Washington (Seattle)
- Biology 220: Introductory Biology
  - Biology 485: Drug Discovery for Infectious Diseases
  - Biology 499: Undergraduate Laboratory Research
  - Chemical Engineering 355/599: Biological Frameworks for Engineers
  - Electrical Engineering 400/546: Biological Frameworks for Engineers
  - English 299: Intermediate Interdisciplinary Writing in the Natural Sciences
  - Mechanical Engineering 498/598: Biological Frameworks for Engineers
  - Microbiology 496: Library Research Project

- 2002-2003 University of Puget Sound (Tacoma, WA)
- Biology 212: Cell Biology
  - Biology 334: Comparative Animal Physiology

## **Research interests**

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- 2019- Transparent alignment of biology learning outcomes and assessments
- Developing Test Question Templates (TQTs) to promote creative practice aligned to tests
- 2004-2019 Integration of the arts into STEM education
- Created musical interventions and tested effects on student attitudes and learning
- 2007-2014 Drug discovery for malaria and other infectious diseases
- Developed assays for high-throughput screening of chemical libraries
  - Identified compounds' possible targets with biochemical and biophysical methods
  - Prioritized possible drug targets using bioinformatic criteria
- 2003-2007 Central metabolism of methylotrophic bacteria
- Studied mechanisms of switching between one-carbon and multi-carbon substrates
  - Measured pathway fluxes, enzyme activities, and metabolite concentrations
  - Improved a kinetic model of methylotrophic metabolism
- 1996-2002 Energy metabolism of human muscle cells
- Tested hypotheses on the control of glycolytic flux in vivo
  - Measured changes in intracellular metabolite levels using NMR spectroscopy
  - Calculated lactate production and ATP turnover from changes in metabolites
- 1993-1995 Sphingolipid metabolism of plant cells
- Studied sphinganine kinase in corn and bean tissue
  - Measured enzyme activity in vitro with radiolabeled substrates

## **Peer-reviewed papers**

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- 2022? D.P. Evans et al. How well do published introductory biology lessons facilitate knowledge transfer? In preparation for *CBE-Life Sciences Education*.
- 2022? G.J. Crowther et al. A 3/4 waltz through science? Three frameworks and four models for using music in science lessons. *International Journal of Science Education*: in review.
- 2021 G.J. Crowther. How do kidneys make urine from blood? Qualitative and quantitative approaches to filtration, secretion, reabsorption, and excretion. *CourseSource*: accepted.
- P.A. Halpin and G.J. Crowther. [Tunes in the zoom room: remote learning via videoconference discussions of physiology songs](#). *Journal of Microbiology and Biology Education* **22**(1): 1-5. [special issue]
- 2020 G.J. Crowther et al. [Is memorization the name of the game? Undergraduates' perceptions of the usefulness of physiology songs](#). *Advances in Physiology Education* **44**(1): 104-12.
- G.J. Crowther et al. [Testing in the age of active learning: Test Question Templates help to align activities and assessments](#). *HAPS Educator* **24**(1): 74-81.
- 2018 T. Caraballo and G. Crowther. [Idea bank: the protein résumé](#). *The Science Teacher* **85**(4): 14-6.

- H. Vu et al. [Fragment-based screening of a natural product library against 62 potential malaria drug targets employing native mass spectrometry.](#) *ACS Infectious Diseases* **13**(4): 431-44.
- S.J. Ward et al. [Songwriting to learn: how high school science fair participants use music to communicate personally relevant scientific concepts.](#) *International Journal of Science Education, Part B* **8**(4): 307-24.
- 2017 G.J. Crowther. [Which way do the ions go? A graph-drawing exercise for understanding electrochemical gradients.](#) *Advances in Physiology Education* **41**: 556-9.
- G.J. Crowther. [Teaching the core concepts of physiology: what, why, and how.](#) *CBE-Life Sciences Education* **16**: fe7. [book review]
- G.J. Crowther et al. [Songwriting to learn: can students learn A&P by writing content-rich lyrics?](#) *HAPS Educator* 21(2): 119-23.
- 2016 G.J. Crowther et al. [Leveraging the power of music to improve science education.](#) *International Journal of Science Education* **38**(1): 73-95.
- G.J. Crowther et al. [Biochemical screening of five protein kinases from \*Plasmodium falciparum\* against 14,000 cell-active compounds.](#) *PLoS ONE* **11**: e0149996.
- 2015 G.J. Crowther et al. [The bacterial Sec pathway of protein export: screening and follow-up.](#) *Journal of Biomolecular Screening* **20**: 921-6.
- G.J. Crowther et al. [Integration of math jingles into physiology courses.](#) *Journal of Mathematics Education* **8**(2): 56-73. [special issue]
- T. Li et al. [High-throughput screening against thioredoxin glutathione reductase identifies novel inhibitors with potential therapeutic value for schistosomiasis.](#) *Infectious Diseases of Poverty* **4**: 40.
- 2014 G.J. Crowther and R.M. Price. [Re: Misconceptions are “so yesterday!”](#) *CBE Life Sciences Education* **13**: 3-5. [letter to the editor]
- G.J. Crowther et al. [Cofactor-independent phosphoglycerate mutase from nematodes has limited druggability, as revealed by two high-throughput screens.](#) *PLoS Neglected Tropical Diseases* **8**: e2628.
- 2013 G.J. Crowther and K. Davis. [Amino Acid Jazz: amplifying biochemistry concepts with content-rich music.](#) *Journal of Chemical Education* **90**: 1479-83.
- G.J. Crowther et al. [Making material more memorable . . . with music.](#) *American Biology Teacher* **75**: 713-4. [invited]
- H. Vu et al. [Plasmodium gametocyte inhibition identified from a natural product-based fragment library.](#) *ACS Chemical Biology* **8**: 2654-9.
- 2012 G. Crowther. [Using science songs to enhance learning: an interdisciplinary approach.](#) *CBE Life Sciences Education* **11**: 26-30. [review]
- G.J. Crowther. [The SingAboutScience.org database: an educational resource for instructors and students.](#) *Biochemistry and Molecular Biology Education* **40**: 19-22.

- G.J. Crowther et al. [A mechanism-based whole-cell screening assay to identify inhibitors of protein export in \*E. coli\* by the Sec pathway.](#) *Journal of Biomolecular Screening* **17**: 535-41.
- M.P. Magarinos et al. [TDR Targets: a chemogenomics resource for neglected diseases.](#) *Nucleic Acids Research* **40**: D1118-27.
- 2011 G.J. Crowther et al. [Identification of inhibitors for putative malaria drug targets among novel antimalarial compounds.](#) *Molecular and Biochemical Parasitology* **175**: 21-9.
- S.N. Hewitt et al. [Expression of proteins in \*Escherichia coli\* as fusions with maltose-binding protein to rescue non-expressed targets in a high-throughput protein-expression and purification pipeline.](#) *Acta Crystallographica Section F* **67**: 1006-9. [special issue]
- 2010 G.J. Crowther et al. [Use of thermal melt curves to assess the quality of enzyme preparations.](#) *Analytical Biochemistry* **399**: 268-75.
- G.J. Crowther et al. [Identification of attractive drug targets in neglected-disease pathogens using an in silico approach.](#) *PLoS Neglected Tropical Diseases* **4**: e804.
- W.A. Guiguemde et al. [Chemical genetics of \*Plasmodium falciparum\*.](#) *Nature* **465**: 311-5.
- E. Skovran et al. [A systems biology approach uncovers cellular strategies used by \*Methylobacterium extorquens\* AM1 during the switch from multi- to single-carbon growth.](#) *PLoS ONE* **5**: e14091.
- 2009 G.J. Crowther et al. [Buffer optimization of thermal melt assays of \*Plasmodium\* proteins for detection of small-molecule ligands.](#) *Journal of Biomolecular Screening* **14**: 700-7.
- 2008 F. Agüero et al. [Genomic-scale prioritization of drug targets: the TDR Targets database.](#) *Nature Reviews Drug Discovery* **7**: 900-7.
- G.J. Crowther et al. [Formate as the main branchpoint for methylotrophic metabolism in \*Methylobacterium extorquens\* AM1.](#) *Journal of Bacteriology* **190**: 5057-62.
- 2007 L. Chistoserdova et al. [Identification of a fourth formate dehydrogenase in \*Methylobacterium extorquens\* AM1 and confirmation of the essential role of formate oxidation in methylotrophy.](#) *Journal of Bacteriology* **189**: 9076-81.
- G.J. Crowther et al. [Molecular and cell biology: an engineering perspective.](#) In: G. Alterovitz and M. Ramoni, eds. *Systems bioinformatics: an engineering case-based approach*. Artech House Publishers. [invited]
- 2006 G. Crowther. [Learning to the beat of a different drum: music as a component of classroom diversity.](#) *CONNECT* **19**(4): 13-5. [invited/special issue]
- 2005 M.G. Kalyuzhnaya et al. [Analysis of gene islands involved in methanopterin-linked C<sub>1</sub> transfer reactions reveals new functions and provides evolutionary insights.](#) *Journal of Bacteriology* **187**: 4607-14.
- 2003 G.J. Crowther et al. [Altered energetic properties in skeletal muscle of men with well-controlled insulin-dependent \(type 1\) diabetes.](#) *American Journal of Physiology* **284**: E655-62.
- 2002 G.J. Crowther and R.K. Gronka. [Fiber recruitment affects oxidative recovery measured in human skeletal muscle in vivo.](#) *Medicine and Science in Sports and Exercise* **34**: 1733-7.

- G.J. Crowther et al. [The control of glycolysis in contracting skeletal muscle. I. Turning it on.](#) *American Journal of Physiology* **282**: E67-73.
- G.J. Crowther et al. [The control of glycolysis in contracting skeletal muscle. II. Turning it off.](#) *American Journal of Physiology* **282**: E74-9.
- G.J. Crowther et al. [A “functional biopsy” of muscle properties in sprinters and distance runners.](#) *Medicine and Science in Sports and Exercise* **34**: 1719-24.
- 2001 K.E. Conley et al. [Limits to sustainable muscle performance: interaction between glycolysis and oxidative phosphorylation.](#) *Journal of Experimental Biology* **204**: 3189-94. [special issue]
- 1997 G.J. Crowther and D.V. Lynch. [Characterization of sphinganine kinase activity in corn shoot microsomes.](#) *Archives of Biochemistry and Biophysics* **337**: 284-90.

## **Other papers and creative work**

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- *Annals of Improbable Research*, 2000-2002
- *Biochemistry and Molecular Biology Education*, 2005
- *Bricolage*, 2015
- *Causeweb.org Fun Collection*, 2017-2019
- *Crosscurrents*, 2018
- *Dynamic Ecology* [blog], 2016-2017, 2019-2021
- *Genetic Engineering & Biotechnology News*, 2012, 2014
- *HAPS Blog*, 2018
- *Journal of Experimental Biology*, 2004-2005
- *LifeSciTRC.org PECOP Blog*, 2018-2020
- *Northwest Runner*, 1998-2002, 2005
- *Nth Degree*, 2002
- *Runner's World*, 2003, 2007, 2010
- *Running Times*, 2012
- *Science Creative Quarterly*, 2006
- *Scientist Sees Squirrel* [blog], 2018, 2020

## **Conference presentations and invited talks**

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- STEM education/outreach
  - American Association for the Advancement of Science (AAAS), 2004
  - Association of American Colleges & Universities (AACU), 2020
  - Bastyr University, 2016
  - ChalkWaves workshop at the Kauffman Foundation (keynote speaker), 2006
  - CLIME Together (UW School of Medicine), 2016, 2021
  - Edmonds Community College, 2018
  - Evergreen State College, 2015
  - Frontiers in Education (FIE), 2005
  - Gold Coast Science Network (keynote speaker), 2004
  - Human Anatomy & Physiology Society (HAPS), 2015, 2021
  - Lincoln County (Oregon) K-12 Ocean Literacy Symposium, 2011
  - National Institute on Scientific Teaching, 2020
  - Northwest Biology Instructors' Organization (NWBIO), 2004, 2013
  - Northwest PULSE, 2021
  - NWABR Student Bio Expo (keynote speaker), 2013

- Rutland High School (commencement speaker), 2003
- VOICES, 2017-2019, 2021
- Western Washington University, 2021
- Laboratory research
  - American College of Sports Medicine (ACSM), 1999
  - American Society for Tropical Medicine and Hygiene (ASTMH), 2008-2009
  - Experimental Biology, 1999-2000
  - International Society for Magnetic Resonance in Medicine (ISMRM), 2001-2002
  - MipTec, 2010
  - Queensland-Washington Alliance, 2009
  - Richard Stockton College of New Jersey, 2007
  - Rosellini Lecture/Symposium at Providence Health & Services, 2000
  - Seattle Parasitology Conference, 2010, 2012-2013
  - University of Montana Western, 2007
  - University of Puget Sound, 2002
  - Western Washington University, 2006
  - Williams College, 2001
  - Wichita State University, 2016

## Grants, honors, and distinctions

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2021-2022	Teaching Career Enhancement Award (TCEA; \$5400) from the American Physiological Society
2021-2022	Fellow of the ROSE (Research On STEM Education) Network
2021	PALM-FRONDS grant (\$2000) to support an undergraduate research assistant
2020	Granted tenure by Everett Community College
2019-2023	Partner Co-Investigator of “Values-based Academic Leadership Trajectories for women in STEM (VAuLTS)” grant from the National Science Foundation (Principal Investigator: Maria A. Garstein, Washington State University)
2019-pres.	<i>HAPS Educator</i> editorial board
2019	First Place (for “Trials and Errors”), A-Mu-Sing Competition, United States Conference on Teaching Statistics (USCOTS)
2018-2019	Fellow of the PALM (Promoting Active Learning and Mentoring) Network
2018-2019	PECOP (Physiology Education Community of Practice) Fellow of the American Physiological Society
2015-2017	Subcontractor of “SMILES (Student-Made Interactive Learning with Educational Songs) for Introductory Statistics” grant from the National Science Foundation (Principal Investigator: Lawrence M. Lesser, University of Texas at El Paso; #1544237)
2012-2013	Principal Investigator of \$50,000 Challenge Grant (“Extending primaquine use via small-molecule stabilization of G6PD mutants”) from the Medicines for Malaria Venture (MMV 12-0081)
2012-2013	Co-writer of \$34,533 Royalty Research Fund grant (“A screen to develop antibiotics that act by a novel mechanism”) from the University of Washington (A74015)

- 2010-2012 Co-Investigator of RCN-UBE grant (“Trial network to bring music to the study of biology”) from the National Science Foundation (Principal Investigator: Wendy K. Silk, University of California Davis; #0956196)
- 2004-2007 Individual Kirschstein NRSA fellowship (“Modular design of central metabolism in methylootrophs”) from the National Institutes of Health (5F32GM070297)
- 1996-1999 Graduate Research Fellowship from the National Science Foundation
- 1995 Graduated *summa cum laude* with highest departmental honors and William C. Grant, Jr. Prize in Biology, Williams College

## **Research students/trainees\* supervised**

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- John E. Alley, 2014
- Yoko L. Chaumont, 2014
- Diana J. Chung (post-baccalaureate), 2008-2009
- Christopher J. Damman (resident in internal medicine), 2008
- Kartheek S. Dasari, 2011-2012
- Dilan P. Evans, 2020-2021
- Jackson C. Jones, 2011-2013
- Kuzma V. Kovzun, 2008-2010
- Mallory M. Krahn, 2011-2013
- Jason E. W.-L. Lum, 2005-2006
- Allison J. Ma, 2016
- Jacob W. McPhee, 2010-2011
- Jack S. Mo, 2011-2014
- Avrey A. Novak, 2014
- Thuong T. H. Phan, 2014-2016
- S. Arshiya Quadri (medical student), 2011
- Benjamin J. Shannon-Alferes, 2010-2011
- Andrew P. Thomas, 2008-2010
- Mengfan Wang (M.S.I.M. student), 2012-2013
- Sarah J. Ward (Ph.D. student, College of Education), 2013-2016
- Tatiana (Phillips) Weaver, 2012-2014
- Sara M. Weller (medical student), 2012
- Jason Wessels (M.Ed. student), 2015-2016
- Daniel W. Yates, 2005-2006

\*undergraduates, unless noted otherwise

## **Intramural service and activities**

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- 2017-2018 New Faculty Academy, Everett Community College
- 2015-2016 Fellow, Facilitated Faculty Learning Community on Reflective Teaching, University of Washington Bothell
- 2015-2016 Curriculum committee, Division of Biological Sciences, University of Washington Bothell
- 2011-pres. Biology Learning and Teaching (BLT) group / Biology Education Research Group (BERG), University of Washington

2003-2005      Scholarship of Teaching & Learning (SoTL) committee, University of Washington

## **STEM outreach**

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2013              Summer instructor, Upward Bound program, University of Washington (Seattle)

2011-pres.        Science/STEM events and consultations for students and families

- Brain Awareness Week (UW), 2013
- Life Sciences Research Weekend (NWABR/Pacific Science Center), 2013
- Glacier Peak High School: Night of the Arts & Science, 2017
- Inspire STEM (UW-Bothell), 2015
- Paws-On Science (Pacific Science Center/UW), 2011-2013
- Seattle Academy (SAAS): expert review of final projects, 2017
- Seattle Girls' School: email expert, 2014, 2016-2019, 2021
- Seattle Science Festival, 2013
- Student Bio Expo (NWABR), 2011-2018
- Totem Middle School STEM Night, 2014
- Yakima Science & Engineering Festival (GEAR UP), 2012-2013

2011-2014        Community outreach and special events for UW School of Medicine

- Biotechnology Advisory Board, Department of Genome Sciences, 2012-2014
- Hosted visiting high school students, 2011-2014
- Featured speaker at Mini Medical School, 2012

2004-2006        Guest lecturer, Genetics Outreach for Minorities (GenOM) Project, University of Washington (Seattle)

2004-2005        Summer instructor, GEAR UP program, University of Washington (Seattle)

## **Peer reviews**

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- Grant proposals
  - Civilian Research & Development Foundation, 2004
  - Institute of Translational Health Sciences (ITHS), 2010
  - Medical Research Council (UK), 2014
  - NIH Recovery Act Limited Competition (RC4 mail review), 2010
  - National Science Foundation, 2019
  - UEFISCDI (Romania), 2012
  - University of Washington Royalty Research Fund, 2013
  - UW-Bothell SRCP, 2021
- STEM education/outreach manuscripts
  - *Academia Letters*, 2021
  - *Biology* (7<sup>th</sup> edition) by Campbell & Reece, 2003
  - *Biological Basis of Disease* [book proposal], 2015
  - *CourseSource*, 2019
  - *HAPS Educator*, 2018-2021
  - *Hole's Human Anatomy & Physiology* (15<sup>th</sup> edition) by Shier et al., 2019
  - *Human Anatomy & Physiology* by Amerman, 2016
  - *International Journal of Science Education*, 2017-2021
  - *Journal of Chemical Education*, 2019
  - *Journal of Mathematics and the Arts*, 2014
  - *Journal of Mathematics Education*, 2015
  - *Journal of Natural History Education and Experience*, 2014
  - *LIFE: The Science of Biology* (7<sup>th</sup> edition) by Purves et al., 2003
  - *PLoS ONE*, 2021
  - *Research in Science & Technological Education*, 2017
  - *Science Education*, 2017-2020



- Laboratory research manuscripts
  - *Acta Crystallographica Section F*, 2012
  - *Applied Biochemistry and Biotechnology*, 2016
  - *BBA Molecular Cell Research*, 2013
  - *Biochemistry*, 2012
  - *BMC Complementary and Alternative Medicine*, 2016
  - *Current Drug Targets*, 2010
  - *Drug Discovery Today*, 2014
  - *Electronic Journal of Biotechnology*, 2016
  - *Enzyme and Microbial Technology*, 2014
  - *F1000 Research*, 2017
  - *Journal of Biomolecular Screening*, 2011-2013
  - *Journal of Helminthology*, 2012
  - *Letters in Drug Design & Discovery*, 2013
  - *Malaria Journal*, 2016
  - *Medicinal Research Reviews*, 2013
  - *Medicine and Science in Sports and Exercise*, 2003-2004
  - *Molecular & Biochemical Parasitology*, 2007
  - *Parasitology Research*, 2010
  - *PLoS Neglected Tropical Diseases*, 2010, 2013
  - *PLoS ONE*, 2014