John Russell Bracht

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August 2022

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Lab Website: https://edspace.american.edu/brachtlab/home

Twitter: @BrachtLab, Instagram: brachtlab

EDUCATION

University of California, San Diego: Ph.D Biology, December 12, 2009. Dissertation: *Analysis of lin-4 microRNA biogenesis and function in C. elegans.* (Mentor: Dr. Amy Pasquinelli)
New Mexico Tech: Bachelor of Science in Biology, *summa cum laude* 2001

POSITIONS HELD

American University: Associate Professor of Biology, 2020-present
American University: Assistant Professor of Biology, 2014-2020
American University: Affiliate, dept. of Management, Kogod School of Business, 2017- present
Princeton University: Postdoctoral Research Fellow, 2009-2014 (Mentor: Dr. Laura Landweber)

HONORS & AWARDS

AU Partners in Teaching Award, American University, 2018.
Jack Child Teaching with Technology Award, American University, 2015.
AU Summer Scholars & Artist Award (as a mentor), American University, 2015.
Postdoctoral Fellowship, Ruth L. Kirchstein (F32) NRSA, NIH (NIGMS), 2012-2014.
Postdoctoral Fellowship, New York University Parasitology dept. (declined), 2009. Accepted funded postdoctoral position at Princeton University with Laura Landweber.
New Mexico Tech Silver Scholar, 1998-2001. Full tuition.

TEACHING EXPERIENCE (* new course preparation)

CORE-105 *Obesity: a Complex Crisis.* (Complex Problems) Fall 2018*, Fall 2019, Fall 2021
BIO-210 *General Biology 2*. Fall 2017*, Spring 2018, Fall 2018, Spring 2019, Fall 2020, Fall 2021, Spring 2022, Fall 2022
BIO-489 (undergraduate) & *Bio-689 (graduate) *Biotechnology*. Spring 2016*, Spring 2020.
BIO-487 (undergraduate) & *BIO-687 (graduate) *Principles of Genomics.* Fall 2015*, Fall 2019, Fall 2021.
BIO-478 (undergraduate) & BIO-678 (graduate): *Computational Genomics*. Spring 2015*, Fall 2016, Spring 2019. co-Winner of Jack Child Teaching with Technology award for 2015.
Independent study (BIO-690 or PSM-690): Fall 2021 (Ware), Spring 2022 (Almanzar and Valdes) Summer 2022 (Okafor)

RESEARCH ARTICLES ([a] = AU graduate student, † = AU undergraduate student)

Acker ID, Ware MJ, **Bracht JR*.** *Surface detection of SARS-CoV-2 by lateral flow LAMP*. bioRxiv 2022.04.04.487067; doi: https://doi.org/10.1101/2022.04.04.487067 (*corresponding.)

Asalone KC[a], Takkar AK†, Saldanha CJ, **Bracht JR***.*A transcriptomic pipeline adapted for genomic sequence discovery of germline restricted sequence in zebra finch, Taeniopygia guttata.* Genome Biol Evol. 2021 Jun 8;13(6):evab088 (*corresponding.)

Asrat TM[a], Cho W, Liu FA†, Shapiro SM, **Bracht JR**, Zestos AG. *Direct Detection of DNA and RNA on Carbon Fiber Microelectrodes Using Fast-Scan Cyclic Voltammetry*. (2021) ACS Omega, 6, 10, 6571–6581

Kaufmann J., Asalone KC[a], Corizzo R., Saldanha C., **Bracht JR**., Japkowicz N. (2020) *One-Class Ensembles for Rare Genomic Sequences Identification*. In: Appice A., Tsoumakas G., Manolopoulos Y., Matwin S. (eds) Discovery Science. DS 2020. Lecture Notes in Computer Science, vol 12323. Springer, Cham.

Asalone KC[a], Ryan K[a], Yamadi M[a], Cohen AL†, Farmer WG†, George DJ, Joppert C†, Kim K†, Mughal MF, Said R, Toksoz-Exley M, Bisk E, **Bracht JR***. *Regional sequence expansion or collapse in heterozygous genome assemblies.* (2020) PLoS computational biology 16 (7), e1008104. (*corresponding)

Cordero, A.D.†; Callihan, E.C.; Said, R.[a]; Alowais, Y.[a]; Paffhausen, E.S. †; **Bracht, J.R***. *Epigenetic Regulation of Neuregulin-1 Tunes White Adipose Stem Cell Differentiation*. Cells 2020, 9, 1148. (*corresponding)

Lindblad KA, Pathmanathan JS, Moreira S, **Bracht JR**, Sebra RP, Hutton ER, Landweber LF. *Capture of complete ciliate chromosomes in single sequencing reads reveals widespread chromosome isoforms*. BMC Genomics 20, 1037 (2019)

Weinstein DJ[a], Allen S[a], Lau M, Erasmus M, Asalone KC[a], Walters-Conte K, Deikus G, Sebra R, Borgonie G, van Heerden E, Onstott TC, **Bracht JR*.** *The genome of a subterrestrial nematode reveals adaptations to heat.* Nat Commun 10, 5268 (2019) (*Corresponding.)

Yerlici, VT, Lu MW, Hoge CR, Miller RV, Neme R, Khurana JS, **Bracht JR**, Landweber LF. *Programmed genome rearrangements in Oxytricha produce transcriptionally active extrachromosomal circular DNA*. Nucleic Acids Research (2019). gkz725, https://doi.org/10.1093/nar/gkz725.

Guerin M†, Weinstein DJ[a], **Bracht JR***. *Stress-adapted Mollusca and Nematoda exhibit convergently expanded Hsp70 and AIG1 gene families.* J Mol Evol (2019) 87: 289. (*Corresponding.)

Guerin, Weinstein, and Bracht 2019 was nominated for the 2019 Zuckerlandl prize for best paper of the year: Liberles DA. 2019 Zuckerkandl Prize. J Mol Evol. 2020 Mar;88(2):121.

Beh LY, Debelouchina GT, Clay DM, Thompson RE, Lindblad KA, Hutton ER, **Bracht JR**, Sebra RP, Muir TW, Landweber LF. *Identification of a DNA N6-Adenine Methyltransferase Complex and Its Impact on Chromatin Organization*. Cell. 2019 June 13.

Nelson MM[a], Waldron CL†, **Bracht JR***. *Rapid molecular detection of macrolide resistance*. BMC Infect Dis. 2019 Feb 12;19(1):144. (*Corresponding.)

Asalone KC[a], Nelson, MM[a], **Bracht JR***. *Novel sequence discovery by subtractive genomics*. 2019. J. Vis. Exp. (143), e58877. (*Corresponding.)

Paffhausen ES†[1], Alowais Y[a1], Chao CW†, Callihan EC, Creswell K, **Bracht, JR***. *Discovery of a stem-like multipotent cell fate.* American Journal of Stem Cells. 2018 June 10 ;7(2):25-37. ([1]= co-first authors. * corresponding.)

Biederman MK[a], Nelson MM[a], Asalone KC[a], Pedersen AL[a], Saldanha CJ, **Bracht JR***. *Discovery of the first germline-restricted gene by subtractive transcriptomic analysis in the zebra finch Taeniopygia guttata.* Current Biology. 2018 May 21;28(10):1620-1627. (*Corresponding.) --**Commentary**: Smith JJ. *Programmed DNA Elimination: Keeping Germline Genes in Their Place.* Curr Biol. 2018 May 21;28(10):R601-R603.

Lindblad KA[1], **Bracht, JR[1]**, Williams AE, Landweber LF. *Thousands of RNA-cached copies of whole chromosomes are present in the ciliate Oxytricha during development*. RNA. 2017 Aug; 23(8):1200-1208. ([1] co-first authors.)

Bracht JR[1]*, Wang X[1]*, Shetty K, Chen X, Uttarotai G[a], Callihan E†, McCloud S, Clay D, Wang J, Nowacki M, Landweber LF*. *Chromosome fusions triggered by noncoding RNA*. RNA Biology. 2016 Jun 7:1-12.
([1] co-first authors. * Corresponding.)

Chen X[1], **Bracht JR[1],** Goldman A, Swart E, Dolzhenko E, Swart E, Clay D, Perlman DH, Doak TG, Stuart A, Amemiya C, Landweber LF. *The architecture of a scrambled genome reveals massive levels of genomic rearrangement during development.* Cell. 2014 Aug 28:158(5):1187-98. ([1] co-first authors.)

Swart E, **Bracht JR**, Magrini V, Minx P,Chen X, Zhou Y, Khurana J, Goldman AD, Nowacki M, Schotanus K, *et al. The Oxytricha trifallax Macronuclear Genome: A Complex Eukaryotic Genome with over 16,000 Tiny Chromosomes.* PLoS Biology. 2013 Jan 29;11(1).

Fang W, Wang X, **Bracht JR**, Nowacki M, Landweber LF. *Piwi-Interacting RNAs Protect DNA Against Loss During Oxytricha Genome Rearrangement.* Cell. 2012 Dec 7;151(6):1243-1255.

Bracht JR*, Perlman DH, Landweber LF*. *Cytosine methylation and hydroxymethylation mark DNA for elimination in Oxytricha trifallax.* Genome Biology. 2012 Oct 17;13(10):R99. (*corresponding).

Bracht JR[1], Van Wynsberghe PM[1], Mondol V, Pasquinelli AE. *Regulation of lin-4 miRNA expression, organismal growth and development by a conserved RNA binding protein in C. elegans.* Dev Biol. 2010 Dec 15;348(2):210-21.

([1] co-first authors.)

Bagga S, **Bracht J**, Hunter S, Massirer K, Holtz J, Eachus R, Pasquinelli AE. *Regulation by let-7 and lin-4 miRNAs results in target mRNA degradation*. Cell. 2005 Aug 26;122(4):553-563

Bracht J[1], Hunter S[1], Eachus R, Weeks P, Pasquinelli AE. *Trans-splicing and polyadenylation of let-7 microRNA primary transcripts.* RNA. 2004 10:1586-1594
([1] co-first authors.)

REVIEW ARTICLES & BOOK CHAPTERS ([a] = AU graduate student, † = AU undergraduate student)

Jayabalan M, Caballero ME, Cordero AD, White BM, Asalone KC, Moore MM, Irabor EG, Watkins SE, Walters-Conte KB, Taraboletti A, Hartings MR, Chow BY, Saeed BA, Bracht KA, **Bracht JR**.* *Unrealized potential from smaller institutions: Four strategies for advancing STEM diversity*. Cell 2021 Nov 24;184(24): 5845-50.

Bracht JR, Vieira-Potter VJ, De Souza Santos R, Oz OK, Palmer BF, Clegg DJ. *The role of estrogens in the adipose tissue milieu.* Ann. N.Y. Acad. Sci., 1461: 127-143. (2019). **Refereed. Cover image.**

Bruun, K[1]. Schermer E[1]. Sivendra A[1], Valaik E[1], Wise RB[1]. Said R[a], **Bracht JR*.** *Therapeutic applications of adipose-derived stem cells in cardiovascular disease*. American Journal of Stem Cells. 2018;7(4):94-103. ([1] Equal contribution. * Corresponding.) **Refereed.**

Bracht JR*. *RNA-mediated somatic genome rearrangement in ciliates.* Somatic Genome Variation in Animals, Plants, and Microorganisms. Edited by Xiu-Qing Li. Wiley-Blackwell, Hoboken, NJ, 2017. Ch. 8, pp 167-198. (* corresponding.)

Bracht JR*, Ferraro EM†, Bracht KA. *How do cysts know when to hatch? The role of ecological communication in awakening latent life.* Biocommunication of Ciliates. Edited by Guenther Witzany and Mariusz Nowacki. Springer. 2016 97:119
(* corresponding.)

Bracht JR. *Beyond transcriptional silencing: Is cytosine methylation a widely conserved eukaryotic DNA elimination mechanism?* BioEssays. April 2014 36(4):346-52. **Refereed**.

Goldman, A. D., Stein, E. M., **Bracht, J. R**. and L. F. Landweber. *Programmed Genome Processing in Ciliates*. Discrete and Topological Models in Molecular Biology. Natural Computing Series. Edited by N. Jonoska and M. Saito. Springer Berlin Heidelberg. 2014 273-287.

Bracht JR, Fang W, Goldman AD, Dolzhenko E, Stein EM, Landweber LF. *Genomes on the Edge: Programmed Genome Instability in Ciliates.* Cell. 2013 Jan 31;152(3):406-416. **Refereed.**

Pasquinelli AE*, Hunter SE, **Bracht J**. *MicroRNAs: A Developing Story*. Curr Opin Genet Dev. April 2005 15:200-205 (*corresponding.) **Refereed.**

PUBLICATIONS IN PREPARATION, REVIEW, OR REVISION
([a] = AU graduate student, † = AU undergraduate student)

Valdes N, Almanzar E. **Bracht JR**. *A screen of FDA-approved compounds identifies new epigenetic modifiers.* In preparation.

Guerin MG, Ware MJ, **Bracht JR*.** *The mitochondrial genome of Halicephalobus mephisto shows evidence of positive selection in the COX-I gene.* In preparation. (*Corresponding.)

GRANTS (External)

Funded (indicates current)*

***National Institutes of Health (**NIGMS). 1 R15 GM146207-01. 06/07/2022 -- 06/06/2025
Bracht = PI
Total Funding: $ 425,814.
Title: "Investigating the molecular basis of evolved stress resilience in a subterrestrial nematode."

***National Science Foundation.** Grant #2050260. 06/01/2021-05/31/2025.
Bracht = Co-PI
Total funding: $1,088,636
Title: "Targeted neurosteriodogenesis and complex memory function."

National Science Foundation. I-Corps Sites. 08/29/2017-08/28/2022.
Bracht = Co-PI.
Total funding: $254,473.
Title: Type I: Tenlytown I-Corps Site."

National Science Foundation. I-Corps Teams**.** 12/01/2016 – 11/30/2017. PI role.
Total funding $50,000.
Title: **"**Using genomics to detect pathogens."

Career Development Award (K22), NIH (National Cancer Institute), 09/15/2014 – 08/31/2017. PI role.
Total funding $456,819.
Title: "Model Systems for the Investigation of DNA Methylation and Drug Repurposing."

Ruth L. Kirchstein (F32) NRSA Postdoctoral Fellowship, NIH (NIGMS). 08/01/2012 – 07/31/2014. Postdoctoral role.
Total funding $106,132.
Title: "Epigenetic Regulation of Programmed Genome Instability in O. trifallax."

Submitted and Pending:

National Science Foundation. 09/01/2022—08/31/2025
PI Role.
Total Funding: $ 969,367
Title: "MRI: Acquisition of a High-Performance Computer Cluster for Research and Education at American University."

GRANTS (Internal)

Mellon Faculty Development Fund, American University, Spring 2022. PI Role.
Total Funding: $2,000
Title: "Discovery of new epigenetic compounds for cancer therapy."

DC Space Grant Consortium Fund, American University, Summer 2020-Spring 2021. PI Role.
Total Funding: $11,548
Title: "Stress: from a subterrestrial nematode to space."

Mellon Faculty Development Fund, American University, Spring 2019. PI Role.
Total Funding: $1,300
Title: "Exploring the epigenetic landscape of the devil worm."

Mellon Faculty Development Fund, American University, Fall 2018. PI Role.
Total Funding: $2,000
Title: " Supporting Active Research: Funds for Page Charges from the Bracht Lab"

Faculty Research Support Grant, American University, May 1, 2018-April 30, 2019. PI role.
Total funding: $10,000
Title: "Investigating the epigenetic control of fat differentiation."

Mellon Faculty Development Fund, American University, 11/27/2017 – 11/26/2018. PI role.
Total funding: $2,000
Title: "Investigating the epigenetics of obesity"

Mellon Faculty Development Fund, American University, 05/16/2017 - 05/15/2018. PI role.
Total funding: $2,000
Title: "Publishing the Genome of the Devil Worm and Annotating the Dark Matter of the Zebra Finch Genome."

DC NASA Space Grant Consortium, AU STEM Faculty Summer Research Program.
05/20/2016 – 08/25/2016. PI role.
Total funding $18,320.
Title: "Investigating the Limits of Life: Genomics of Complex Life in the Deep Terrestrial Subsurface."

Faculty Research Support Grant, American University, 05/01/2016 – 04/30/2017. Co-PI with Colin Saldanha and Kathryn Walters-Conte.

Total funding $22,845.
Title:"Genomics of Songbird Sex Determination."

Mellon Faculty Development Fund, American University, 11/12/2014 – 11/11/2015. PI role.
Total funding $4,000.
Title: "Annotating and Analyzing the Genome of the Devil Worm."

Faculty Research Support Grant, American University, 05/01/2015 – 04/30/2016. Co-PI with Dr. Kathleen DeCicco-Skinner.
Total funding $10,000.
Title: "Investigating the Epigenetic Memory of Obesity."

PATENTS

Bracht JR, Nelson MM, Bellows W, Walters-Conte K. "A direct-to-consumer genomic diagnostic device." Non-provisional. Patent # 16/352,083 filed March 13, 2019.

Wang, X., **Bracht, J. R**. "DNA origami nanoparticle delivery of programmed chromosome breakage machinery: a novel cancer therapy and research tool." Non-provisional. PCT/US2018/067058. Filed Dec. 21, 2018.

Bracht JR. Method for promoting adipocyte differentiation and obesity-related disease treatment. Non-Provisional (filed, allowed by patent office, and fees paid). Patent App. Ser. No. 16/662,457, priority date October 25, 2018.

SERVICE (Internal)

American University Biology Department

Diversity, Equity, and Inclusion Committee Member, 2021-present.
Term Search Committee Chair, Summer 2021. Successfully hired two term faculty.
Microbiology Tenure Line Search Committee Member, Fall 2021-Spring 2022. Successful hire.
Honors Committee Member, 2018-2020.
Undergraduate Committee Member, 2014-2020.
Faculty Summer Research Seminar Series Co-organizer, summer 2016.
Search Committee Member, Fall 2014. Assistant Lab Director Position.

College of Arts and Sciences, American University

Director, Biotechnology MS program. Fall 2020-present.
HHMI Driving Change Faculty Learning Community Member. Fall 2021—Spring 2022.
Computer Science Faculty Search committee member. Hired 3 tenure-track faculty. Oct. 2017-Feb. 2018.
CAS Postdoctoral Fellow for Academic Diversity search committee member. Sept-2018-March 2019.

American University

AU Partners in Teaching, Mentor role. Sept. 2018-present.
Alternate Radiation Safety Officer, American University, 2014-present.
Biosafety Committee Member, American University, 2018-present

SERVICE (External)

Associate Editor, Journal of Molecular Evolution. 2018-present
Associate Editor, Genes. 2020-present

Invited manuscript reviewer for: BMC Evolutionary Biology (2017), PLoS ONE (2018), Yale Journal of Biology and Medicine (2016), RNA Biology (2015), Scientific Reports (2022), Biomedicines (2022), PLOS One (2021), Animals (2022),

Invited Book Proposal Reviewer. Oxford University Press (2022).

Invited Panelist for NSF Grant Review. February 2017, June 2019.

Invited Panelist for European Research Council (ERC) Grant Review. May 2019.

MEMBERSHIP

Genetics Society of America (GSA)

MENTORING

Behavior, Cognition, and Neuroscience Ph.D Program Thesis Chair (student from Bracht Lab)

Kathryn Asalone 08/01/2017 - 2021
" Analyzing the Germline-Restricted and W Chromosomes of Zebra Finch."

Biology M.S. Thesis Committee Chair, Students from Bracht lab

Sarah Allen 06/03/2015 – 07/03/2017
"The genomics of subterrestrial adaptation in a nematode."
Currently Ph.D student at Cornell University

Yasir Alowais 09/01/2015 – 12/04/2017
"Investigating the Epigenetics of Obesity."
Currently Working in Biotech

Deborah Weinstein 07/01/2017-05/11/2019
"Genome-wide analysis of gene expression in *Halicephalobus mephisto* (the devil worm)."
Currently Ph.D student at Georgetown

Biotechnology M.S. students from Bracht Lab

Pragati Chengappa 04/15/2015 - 05/31/2016
"Analyzing a novel role for DNA-PKcs in DNA methylation."
Currently Ph.D student at Drexel

Megan Nelson 11/11/2014 – 05/31/2016
"Identifying Genes on the Finch Germline Restricted Chromosome."
Currently Founder of MicroInvestigate, L.L.C

Grace Uttarotai 01/27/2016 – 05/03/2016
"Chromosome Fusion Events."
Currently Working in Biotech

Michelle Biederman 05/01/2016 - 07/03/2017
"Sequencing the Zebra Finch Genomic Dark Matter."
Currently in Ph.D program at Johns Hopkins University

Rana Said 02/11/2018 - 05/11/2019
"Analyzing the role of Neuregulin-1 in stem cells."
Currently in Ph.D program at Tufts University

Monessha Jayabalan
"Transforming C. elegans with Hsp70 from H. mephisto." Jan. 2020 - Summer 2021

Samata Varadkar
"Analysis of *H. mephisto* meiosis." Fall 2021-present

Biology M.S. Thesis Committee Member

Hashani Hettiarachchi 12/01/2015 - 04/15/2015
"Characterization of hyperbiofilm mutants of *Staphylococcus aureus.*"

Pamela Barnett 08/03/2017 - 05/25/2018
"Characterization of a novel antibiotic produced by the marine bacterium *Pseudoalteromonas sp. SW21*"

Brendan Riske 10/01/2018 - 05/11/2019
"Cold tolerance of native *Wolbachia* endosymbiotes in *Aedes albopictus* larvae."

Alexandra Chittams 08/01/2018 - 05/11/2019
" Computational prediction of novel human miRNA target sites in viral genomes."

Joshua Taro 12/01/2018 - 04/05/2019
" SUPERMAN, The Guardian of Floral Organ Gene Expression in *Arabidopsis thaliana*."

Undergraduate Honors Thesis Capstones Mentored

Emily Ferraro 01/06/2015 – 12/16/2015

"Bacterial and Environmental Induction of *Oxytricha* Excystment"

Winner of AU Summer Scholars and Artists Award in summer 2015

Currently in Medical School at Uniform Services University

Cara Chao 02/02/2016 - 05/05/2018

"Investigating a role for DNA-PKcs in DNA methylation."

Winner of Grebe-NASA student scholarship in summer 2016

Currently at NIH in post-baccalaureate IRTA program

Megan Guerin Spring 2019 --Spring 2021

"Investigating the function of ARMET in *Halicephalobus mephisto*."

Winner of Scott A Bass Award for Undergraduate Research 2021

Kyli McKee Fall 2018 - Spring 2020

Uma Neelakatan Fall 2018 - Spring 2020

Nicole Valdes Fall 2021--Spring 2022

Enmy Almanzar Fall 2021--Spring 2022

Additional Undergraduate Students Mentored in Research Laboratory

Sydney Marshall	Fall 2014 - Fall 2015
Matias Bifani	Fall 2014 - Spring 2015
Shakira Saleem	Spring 2015
Juana Cerna	Spring 2015
Casey Lamoreaux	Spring 2015
Evan Callihan	Spring 2015
Carson Merenbloom	Spring 2015
Sean Hall	Spring 2016
Emily Wu	Fall 2017
Emily Paffhausen	Summer 2016 - Fall 2018
Irina Volkov (winner of NSF GRFP award)	Fall 2017 – Fall 2018
Kyli McKee	Fall 2018 - Spring 2020
Uma Neelakatan	Fall 2018 - Spring 2020
Alyssa Cordero	Spring 2019 - Summ. 2021
Ajuni Takkar	Fall 2019 -present
Mark Ware	Fall 2019 – Fall 2021
Isabelle Dahl Acker	Fall 2020 - present
Talia Mitre	Spring 2021 - present
Rebeka Rafi	Spring 2021 – present
Nicole Valdes	Fall 2021- present
Enmy Almanzar	Fall 2021- present
Naomi Greengold	Fall 2021- present
TreVaughn Ellis	Fall 2021- present
Sui Len Par	Spring 2022—present

Postbacs: Gianna Irwin (2021-present), Bianca Brown (2022-present)

Total Undergraduates Mentored in Bracht lab: 22
Total Graduate Students Mentored in Bracht lab: 11 (1 Ph.D, 10 Master's)

CURRICULUM DEVELOPMENT

Development of New Courses at American University

Computational Genomics (Bio – 478 / 678)
Designed & taught Spring 2015, taught Fall 2016 & Spring 2019
Designed as a brand-new addition to the Bio curriculum. This flipped class is a semester-long hands-on mentored genomics workshop. All lectures, in-class exercises, and reading assignments were new for this course. Also coordinated with High-Performance Computing personnel for student accounts. Won the Jack Child Teaching with Technology award in 2015 for this course the first time it was taught. In spring 2019 the student work resulted in a research manuscript, which is in preparation for submission to a journal.

Obesity: a Complex Crisis (Core-105-029)
Designed & taught Fall 2018
Part of the 'Complex Problems' series of freshman seminars, this course was a completely new course. It consisted of weekly lectures plus invited guests and presentations by students.

The Making of Scientific Change (CORE-107-018)
Designed in Fall 2021 and Spring 2022, taught in Fall 2022
Focused on the concept of a paradigm shift as developed by Thomas Kuhn, this course explores a few key scientific transformations through intellectual history. This completely new course was co-developed by faculty in Literature and Biology.

Course description: How does scientific change happen? Science historian Thomas Kuhn argues that the great revolutions of science occurred not when a new fact appeared, but when scientists started to approach the world with new paradigms. This course invites students to reflect on the human and social dimensions of science by examining critical moments in history when scientific thinkers changed their approach in fundamental ways. By learning about changes in scientific thinking from the past, students will work to identify their own assumptions and paradigms, in science and beyond.

Significant Revisions of Existing Courses at American University

Principles of Genomics (Bio – 487/687)
Designed & taught Fall 2015
Designed all-new lectures, in-class genomics exercises, and assignments for this course.

General Biology 2 (Bio-210)
Designed & taught Fall 2017, taught Spring 2018, Fall 2018, Spring 2019
Designed all-new lectures, in-class exercises, and assignments for the course.

Minor Revisions of Existing Courses at American University
Biotechnology (Bio-489 / 689)

Taught Spring 2016
Minor revisions of existing course structure designed by Dr. Kathryn Walters-Conte.

SELECTED INVITED PRESENTATIONS

Rockefeller University, Jarvis Laboratory Guest Lecture. Aug. 24, 2022

George Washington University, Biology Seminar. Oct 14, 2022

Uniformed Services University, Microbiology Seminar. " Exploring the genomics of stress resilience in a subterrestrial nematode from a South African goldmine." April 25, 2022

Center for Teaching, Research, and Learning (CTRL) Summer Faculty Workshops. "Building Data-Driven Assignments". Panelist. August 2019.

Escape Velocity 2019 Sci-Fi Expo. Washington, DC. "Why-Fi, Why is this Fictional? Interplanetary edition." Panel discussion with Morgan Gendel on the likelihood of extraterrestrial encounters with alien life. May 24, 2019.

Department of Literature Colloquium: Mary Shelley's *Frankenstein.* American University. "How to make a monster in seven easy steps: or, the epigenetics of *Frankenstein*." October 24, 2018.

AU STEAM Fair TED-like Talk. American University. "The Underground Genome." October 19, 2018.

NSF I-Corps Teams Opening Weekend. Washington DC. "How to succeed in I-Corps." Jan. 29, 2018**.**

29th Ann Ferren Conference. American University. "I-Corps, Incubator, Innovation, Oh my!" Jan. 12, 2018.

Center for Behavioral Neursocience Seminar. American University. "A neuronal gene that epigenetically controls stem-cell differentiation in adipose tissue." April 5, 2017.

National Institutes of Health (NIH), Rockville, MD (NCATS). "From epigenetic drug to driver." March 24, 2017.

High-Performance Computing Seminar. American University. "The subterranean Genome of the Devil Worm." Oct. 7, 2016

Center for Teaching, Research, and Learning. American University. "Teaching with technology in the era of big data." August 20, 2015.

Center for Behavioral Neuroscience Retreat. American University. "Investigating Genome Dynamics." June 3, 2015.

Chemistry & Biochemistry Department Seminar. American University. "*Oxytricha* genomics: a minority report from the world of Eukaryotic biology." March 18, 2015.

Wake Forest Physics Department Seminar Series. Winston-Salem NC. "A single cell, two genomes: how ciliates are re-shaping our understanding of genomics." March 4, 2015.

Catholic University Biology Department Seminar Series. Washington, DC. "Investigating the Epigenetic Control of Genome Architecture in a Model Eukaryote." September 15, 2014.

New York Academy of Sciences Genome Integrity meeting. NYC. "Cytosine methylation and hydroxymethylation mark DNA for elimination in *Oxytricha trifallax."* Dec 3, 2012.

Princeton University. High Throughput Sequencing Users Group Seminar Series, Sept 2011, and Integrated Science Shorts Seminar Series, Oct. 2013, and Sept. 2011.

SELECTED CONFERENCE PRESENTATIONS

The Biology of Genomes Conference. Online. "Understanding the role of MANF / ARMET in the stress response of the subterrestrial nematode Halicephalobus mephisto" May 11-14, 2021. Poster presentation.

The Allied Genetics Conference (TAGC) online. "The genome of a subterrestrial nematode reveals adaptations to heat." April 22 - 25, 2020. Poster presentation.

The Ciliate Molecular Biology Conference. American University. "Amino acids are inducers of excystment in Oxytricha trifallax." July 20, 2018. Plenary.

Transcriptional and Epigenetic Control in Stem Cells. Olympic Valley, CA. "DNA methylation establishes differentiation-vs-renewal fate balance in human adipose-derived stem cells". January 9, 2017. Poster.

The Adipose Tissue Niche. NIH, Bethesda, MD. "Human adipose differentiation in vitro recreates a stem-cell niche." November 29-30, 2016. Poster.

Stem Cell Epigenetics. Sitges, Spain. "Obesity epigenetically modulates the differentiation-vs-renewal balance in adipose-derived stem cells." September 21, 2015. Poster.

Translating the Cancer Genome. San Francisco, CA. "Chromosome fusions triggered by noncoding RNA." February 7, 2015. Poster.

The Biology of Genomes. Cold Spring Harbor Laboratory, NY. " Chromosome fusions triggered by noncoding RNA". May 5, 2014. Poster.

Ciliate Molecular Biology FASEB meeting, Steamboat Springs, CO. "Oxytricha chromosome fusions triggered by noncoding RNA." July 10, 2013. Plenary.

Plant and Animal Genome XX, San Diego, CA. "RNA-mediated Transgenerational Epigenetic Inheritance of DNA Rearrangements and Copy Number." January 2012. Plenary.