Curriculum Vitae — Dawn M. Carone, Ph.D.

Name: **Dawn M. Carone**
Title and Affiliation: Assistant Professor
Department of Biology
Swarthmore College

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Education

Ph.D. in Genetics & Genomics, University of Connecticut, Department of Molecular and Cell Biology, Laboratory of Dr. Rachel O'Neill, December 2008

- Thesis title: The role of retroviruses and RNA in mammalian centromere competency

B.S. in Molecular and Cell Biology, University of Connecticut, College of Liberal Arts and Sciences, Minor in French Language, May 2004

- Thesis title: Comparative genome analysis of *Mus musculus* and *Peromyscus maniculatus* using fluorescence *in situ* hybridization

Previous Professional Appointments

2014-2016 **Assistant Professor of Biology**, Williams College, Williamstown, MA
2009-2014 **Postdoctoral Fellow**, University of Massachusetts Medical School, Worcester, MA

Research Experience

2009-2014 **Postdoctoral Fellow, Department of Cell and Developmental Biology, University of Massachusetts Medical School,** Laboratory of Dr. Jeanne Lawrence

- Heterochromatin instability and misregulation of noncoding RNA in cancer
- Non-coding repeat RNAs in chromosome structure and genome regulation
- Quantitative detection methods for RNA *in situ* hybridization
- Initiation of X inactivation in human iPS cells
- Bioinformatic analysis of satellite and repeat sequences

2009 **Postdoctoral Associate, Department of Molecular and Cell Biology, University of Connecticut,** January-September 2009, Laboratory of Dr. Rachel O'Neill

- Cloning and deep sequence analysis of small RNA species in the tammar wallaby

2008 **Visiting NSF EAPSI Fellow, Department of Zoology, University of Melbourne, Australia,** June-August 2008, Laboratory of Dr. Marilyn Renfree

- The role of RNA in centromere drive within mammalian interspecific hybrids

2004-2008 **PhD Candidate Research, Department of Molecular and Cell Biology, University of Connecticut,** Laboratory of Dr. Rachel O'Neill

- The role of RNA in mammalian centromere function
- Functional characterization of Kangaroo Endogenous Retrovirus (KERV)
- Localization of KERV to breaks of synteny in *Macropus eugenii* and *Monodelphis domestica*

2003-2004 **Undergraduate Thesis Research, Department of Molecular and Cell Biology, University of Connecticut**

- Comparative genome analysis of *Mus musculus* and *Peromyscus maniculatus* by fluorescence *in situ* hybridization

Awards & Fellowships

2018-2019 **Scientific Teaching Fellow,** 2018 Summer Institute on Scientific Teaching. Fellowship resulting from participation in a Summer Institute led by the Yale Center for Teaching & Learning in July 2018.

2017-2019 **Charles E. Kaufman Foundation of the Pittsburgh Foundation,** New Investigator Research Grant. 2 year research support totaling $150,000, September 2017-August 2019

2012 **Zelda Haidek Memorial Scholar Fellowship**, UMass Medical School, Awarded to an outstanding female trainee each year.

2010-2013 **NIH/NCI Ruth L. Kirschstein NRSA Postdoctoral Fellowship**

2008 **NSF EAPSI Fellow,** National Science Foundation East Asia and Pacific Summer Institute. Supported a summer fellowship I conducted to study marsupial centromeres in Melbourne, Australia.

2008 **Doctoral Dissertation Fellowship,** UConn, September - November 2008. Competitive award to supplement stipend while preparing dissertation.

2008 **DEMI Fellowship,** UConn Department of Molecular and Cell Biology. Two competitive awards given to upper level graduate student to supplement stipend while completing research activities in preparation for graduation.

2008 **Best poster,** Mechanisms and Control of Mitosis meeting, May

2006 **Honorable Mention**, National Science Foundation Graduate Research Fellowship Program

2006 **Claire Berg Fellowship in Genetics,** University of Connecticut. Awarded to an outstanding female graduate student yearly.

Peer-reviewed Publications

1. Cheng YF*, Strachan M*, Weiss Z*, Moniher D*, **Carone DM**, Ganapati, V. Illumination Pattern Design with Deep Learning for Single-Shot Fourier Ptychographic Microscopy. Opt. Express 27, 644-656 (2019).

2. Hall, LL, Byron M, **Carone DM**, Whitfield T, Pouliot GP, Fischer A, Jones PL, Lawrence JB. Demethylated HSATII DNA and HSATII RNA foci sequester PRC1 and MeCP2 into cancer-specific nuclear bodies. *Cell Reports* 2017, **18**, 2943-2956.

3. Carone BR, Jung JH, Hainer SJ, Min-Te Chou, **Carone DM**, Weng Z, Fazzio TG, Rando OJ. High resolution mapping of chromatin packaging in mouse ES cells and sperm. *Developmental Cell* 2014 Jul 14;30 (1): 11-22.

4. Hall LL*, **Carone DM*,** Gomez AV, Kolpa HJ, Byron M, Fackemlayer FO, Lawrence JB. Stable CoT-1 repeat RNA is abundant and associated with euchromatic interphase chromosomes. *Cell* 2014, *156*, 907-919.
*co-first author manuscript

5. Jiang J, Jing Y, Cost GC, Kolpa H, Cotton AM, Chiang J, **Carone DM**, Carone BR, Shivak DA, Guschin DY, Pearl JR, Rebar EJ, Byron M, Gregory PD, Brown CJ, Urnov FD, Hall LL, Lawrence JB. Translating Dosage Compensation to Trisomy 21. *Nature* 2013 *500*, 296-300.

6. **Carone DM** and Lawrence JB. Heterochromatin instability in cancer: From the Barr body to satellites and the nuclear periphery. *Seminars in Cancer Biology*, 2013 Apr;23(2):99-108.

7. **Carone DM,** Zhang, C**,** Hall LE, Obergfell C, Carone, BR, O'Neill MJ, O'Neill RJ. Hypermorphic expression of centromeric retroelement-encoded small RNAs impairs Cenp-A loading. *Chromosome Research* 2013 Mar;21(1):49-62.

8. Lindsay J, **Carone DM**, Brown J, Hall L, Qureshi S, Mitchell S, Jannetty N, Hannon G, Renfree M, Pask A, O'Neill MJ and O'Neill RJ. Unique small RNA signatures uncovered in the tammar wallaby genome. *BMC Genomics* 2012, **13:559**

9. Yu H, Lindsay J, Feng Z, Frankenberg S, Hu Y, **Carone DM**, Shaw G, Pask AJ, O'Neill RJ, Papenfuss AT and Renfree MB. Evolution of coding and non-coding genes in HOX clusters of a marsupial. *BMC Genomics* 2012, **13**:251

10. Brown JD, **Carone DM**, Flynn BL, Finn CE, Mlynarski EE, O'Neill RJ. Centromere conversion and retention in somatic cell hybrids**.** *Cytogenet Genome Res*. 2011;134(3):182-90. Epub 2011 Jun 29.

11. Renfree MB, Papenfuss AT, Deakin JE, Lindsay J, Heider T, Belov K, Rens W, Waters PD, Pharo EA, Shaw G, Wong ES, Lefevre CM, Nicholas KR, Kuroki Y, Wakefield MJ, Zenger KR, Wang C, Ferguson-Smith M, Nicholas FW, Hickford D, Yu H, Short KR, Siddle HV, Frankenberg SR, Chew KY, Menzies BR, Stringer JM, Suzuki S, Hore TA, Delbridge ML, Mohammadi A, Schneider NY, Hu Y, O'Hara W, Al Nadaf S, Wu C, Feng ZP, Cocks BG, Wang J, Flicek P, Searle SM, Fairley S, Beal K, Herrero J, **Carone DM**, Suzuki Y, Sagano S, Toyoda A, Sakaki Y, Kondo S, Nishida Y, Tatsumoto S, Mandiou I, Hsu A, McColl KA, Landsell B, Weinstock G, Kuczek E, McGrath A, Wilson P, Men A, Hazar-Rethinam M, Hall A, Davies J, Wood D, Williams S, Sundaravadanam Y, Muzny DM, Jhangiani SN, Lewis LR, Morgan MB, Okwuonu GO, Ruiz SJ, Santibanez J, Nazareth L, Cree A, Fowler G, Kovar CL, Dinh HH, Joshi V, Jing C, Lara F, Thornton R, Chen L, Deng J, Liu Y, Shen JY, Song XZ, Edson J, Troon C, Thomas D, Stephens A, Yapa L, Levchenko T, Gibbs RA, Cooper DW, Speed TP, Fujiyama A, Graves JA, O'Neill RJ, Pask AJ, Forrest SM, Worley KC. Genome sequence of an Australian kangaroo, Macropus eugenii, provides insight into the evolution of mammalian reproduction and development. *Genome Biol*. 2011 Aug 19;12(8):R81.

12. **Carone DM,** Longo MS, Ferreri GC, Hall LE, Harris MS, Shook N, Bulazel KV, Carone BR, Obergfell C, O'Neill MJ, O'Neill RJ. 2008. A new class of retroviral and satellite encoded small RNAs emanate from mammalian centromeres. *Chromosoma*. 2009 Feb;118(1):113-25

13. Longo MS, **Carone DM**, NISC Comparative Sequencing Program, Green ED, O'Neill MJ, O'Neill RJ. Distinct retroelement classes define evolutionary breakpoints demarcating sites of evolutionary novelty. *BMC Genomics*, 2009 Jul 24;10:334.

14. O'Neill MJ, Lawton BR, Mateos M, **Carone DM**, Ferreri GC, Hrbek T, Meredith, RW, Reznick D, O'Neill RJ. Ancient and continuing Darwinian selection on insulin-like
growth factor II in placental fishes. *Proc Natl Acad Sci USA*. 2007 vol. 104 pp. 12404-9 (COVER)

15. **Liscinsky (Carone) DM**, Ferreri GC, Mack JA, Eldridge MD, O'Neill RJ. Retention of Latent Centromeres

* indicates Swarthmore College student co-authors

Book Chapters

1. O'Neill RJ & **Carone DM,** "The role of ncRNA in centromeres – a lesson from Marsupials." Centromere – structure and evolution, Springer-Verlag Series "Progress in Molecular and Subcellular Biology". 2009;48:77-101.

2. **Carone DM** and O'Neill RJ. Marsupial Centromeres and Telomeres: Dynamic Chromosome Domains. Marsupial Genetics and Genomics, 2010, Part 2, 55-73.

Research Funding

Current Funding:

NIH NIGMS 1R15GM134495-01 $405, 307 September 2019-August 2022
FUNCTIONAL ANALYSIS OF LOCUS-SPECIFIC PERICENTRIC SATELLITE EXPRESSION
Role: PI (Swarthmore College)

Charles E. Kaufman Foundation, Pittsburgh Foundation $150, 000 September 2017-August 2020
LOCUS-SPECIFIC REGULATION OF PERICENTRIC SATELLITE SEQUENCES
New Investigator Research Grant
Role: PI (Swarthmore College)

NIH NINDS 1R15NS104994-01A1 SUB-AWARD $50,218 August 2018-July 2021
ELUCIDATING THE IMPACT OF THE NPC1NMF164 MUTATION IN THE POSTNATAL CEREBELLAR DEVELOPMENT OF A MOUSE MODEL OF NIEMANN-PICK TYPE C DISEASE (Granted to Dr. Ileana Soto, Rowan University)
Role: PI (Subaward)

Past Funding:

NIH 5F32CA154086 $151,974 December 2010-December 2013
HETEROCHROMATIN INSTABILITY AND MISREGULATION OF NONCODING RNA IN CANCER
NIH Ruth L. Kirschstein National Research Service Award
Role: PI

NSF 0813167 $5,637 June-August 2008
THE ROLE OF RNA IN CENTROMERE DRIVE WITHIN MARSUPIAL INTERSPECIFIC HYBRIDS
NSF East Asia and Pacific Summer Institute Fellowship
Role: PI

Patents

Lawrence JB, Hall LL, Byron M, **Carone DM**.
METHODS OF DIAGNOSING CANCER USING EPIGENETIC BIOMARKERS. US Patent Application 20140213475**,** Awarded July 31, 2014

Selected Invited Talks & Presentations

Invited Speaker, "Sequence Diversity and Misregulation of Pericentric Satellite Sequence", Kaufman Foundation Symposium, October 2018.

Selected Speaker, "Expression of Pericentric Satellite RNA Leads to Aggregation of Chromatin Regulatory Proteins and Cell Division Defects", Gordon Research Conference: Centromere Biology, July 2018.

Invited Speaker, "Misregulation of Junk DNA in Cancer Cells", Rowan University, Dept. of Biology Fall Lecture Series, December 2017

Poster Presentation, "The effect of pericentric satellite expression on cell division" Cold Spring Harbor Symposium: Chromosome Segregation & Structure, May 2017

Poster Preview Talk & Poster Presentation, "Pericentric Satellites: Implications for chromosome evolution and misregulation in cancer", Gordon Research Conference: Centromere Biology, July 2016

Invited Speaker, "Chromosome-associated RNA from the junk of the genome" Hudson Valley RNA Club, University at Albany (SUNY), May 2015.

Selected speaker, "Expression of pericentric satellites in cancer: an approach to reveal locus specific misregulation" 13th annual Ribo Club meeting, Magog, Canada, September 2012

Poster presentation, "Expression of the repeat genome and aberrant epigenetic factors in cancer" Keystone Symposium, Epigenomics, January 2012

Invited speaker, "Deep sequencing of a novel class of small RNA in Australian marsupials." American Genetics Association Meeting: Next Gen Sequencing in Non-model Organisms, University of Connecticut, June, 2009

Invited speaker, "The role of RNA in centromeres – a lesson from Marsupials." Australian National University CMGD Seminar Series, August 2008

Invited speaker, "The role of RNA transcripts in mammalian centromere function." University of Connecticut, Department of Animal Science, DGS 226 - Current Genetic Research, November 2007

Poster presentation, "A new class of retroviral and satellite encoded RNAs emanate from mammalian centromeres." Chromosome Segregation: Centromeres & Kinetochores, October 2008

Teaching

2016-2019	**Swarthmore College** **Fall 2016 & 2017** – Cellular and Molecular Biology & Lab section **Fall 2016 & Spring 2017 -** Directed Reading on Cardiovascular Genetics **Spring 2017 & Fall 2018**– Genetics (Lecture & Lab) **Spring 2018 & Spring 2019** - Genome Regulation by Noncoding RNA (Seminar)
2014-2016	**Williams College** **Fall 2014** - RNA Worlds Senior Seminar (Primary literature-based discussion), Genetics (Lab section) **Spring 2014** – Cellular Regulatory Mechanisms (Lecture & Lab) **Fall 2015** – Genetics (Lecture) **Spring 2016** - RNA Worlds Senior Seminar (Primary literature-based discussion)

- I co-designed and team-taught a series of 5 lab-based module classes for graduate students with topics consisting of Introduction to Molecular Biology, FISH and Cytogenetics Techniques, Real Time PCR, Advanced Sequencing Techniques, and Gene Chip Techniques (Affymetrix)

2006-2007 **Instructor,** University of Connecticut, Cytogenetics and Fluorescence *In Situ* Hybridization Techniques (Undergraduate & Graduate), Summer 2006, Intersession 2007 & Summer 2007

2005-2006 **Instructor,** University of Connecticut, Genotyping and Sequencing Techniques (Undergraduate & Graduate), Fall 2005, Spring 2006

2005-2006 **Teaching Assistant,** University of Connecticut, Graduate level, Laboratory Techniques in Functional Genomics

Research Mentorship

2016-2017 **Swarthmore College**
Undergraduate research students mentored in my lab (at least 1 semester/summer): Rajiv Potluri '20, Jessica Malisa '19, Emily Ferrari '19, Jack Rubien '20, Simone Darkoa-Larbi '18, Anthony Velleca '19, Andi Cheng '21, Sajal Mehta Akkipeddi '20, Moniher Deb '19, Safia Bashir '20, Kyra Harvey '19, Lia D'Alessandro '21, Susannah Midla '21
Honors Thesis Students Mentored: Anna Mischel '18, Anthony Velleca '19, Rajiv Potluri '20, Jack Rubien '20

2014-2016 **Williams College**
Honors Thesis Advisor for 3 students: Diana Kang '15, Catherine Landers '16 and Lacey Serletti '16.
Undergraduate Research Assistants: Catherine (Kiki) Landers '16, Joyce Lee '17, Intekhab Hossein '17, Ian Outhwaite '17, Roya Huang '17.

2009-2014 **J.B. Lawrence Lab, UMass Medical School.** Senior lab member supervising undergraduate, graduate, and medical rotation students.
Anthony Corsten (Summer 2013), Brett Dumas (2012-2014), Jen-Chieh Chiang (2011), Mihir Metkar (2011), Nitish Mehta (2011).

2006-2008 **UConn Mentor Connection**
- Mentored several high school students for 8 weeks throughout the summer on independent laboratory projects to gain hands-on lab experience.

Academic Service

2018-2019 **Swarthmore College,** Ad Hoc Faculty Child Care Committee
Institutional Biosafety Committee
Course Coordinator, BIOL097
Biology Faculty Search Committee

2017-2018 **Swarthmore College,** Fellowships & Prizes Committee
Biology Faculty Search Committee

2015-2016 **Williams College**, Faculty Lecture Series Committee & Biology Seminar Coordinator

2015 **Coordinator**, Summer Course Design Group for new faculty at Williams College

- This group was led by a teacher educator and focused on implementing active learning techniques in the classroom and principles of backward design

2013-2014 **UMMS Epigenetics Club Coordinator**

- Developed and coordinated an in-house seminar series to bring together researchers focused on epigenetics in development and disease from across campus department

Professional Service & Development

Discussion Leader for 2018 Gordon Research Seminar: Centromere Biology

Invited Speaker, UPenn Biomedical Postdoctoral Program Career Workshop, "Faculty Appointments at 4-Year Colleges", March 2018
An invited talk for UPenn Postdoctoral Fellows to share insight and information about pursuing faculty positions at Primarily Undergraduate Institutions.

2018 Summer Institute on Scientific Teaching, Participant in 2018 Summer Institute, University of Connecticut, July 2018
This was a 5-day intensive workshop focused on developing strategies to promote an inclusive classroom using active learning techniques to promote engagement and student learning, especially for under-represented minority students.

Manuscript Reviewer: Chromosome Research**,** Nucleic Acids Research

Textbook Reviewer: Sinauer Associates

Professional Affiliations

Active Member, Genetics Society of America
Active Member, America Society for Cell Biology
Active Member, Sigma Xi