# Sarah G. Swygert, Ph.D.

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## Positions and Affiliations

**Assistant Professor** 2022-present
Department of Biochemistry and Molecular Biology
Faculty Member, Cell and Molecular Biology Program
Affiliate Faculty, Data Science Research Institute
Colorado State University, Fort Collins, Colorado

## Education and Training

**Postdoctoral Fellow** 2015-2021
Fred Hutchinson Cancer Research Center, Seattle, Washington
Research Advisor: Toshio Tsukiyama, Ph.D., D.V.M.
Topic: Mechanisms and functions of repressive chromatin structure in quiescent cells.

**Doctor of Philosophy** (Biochemistry and Molecular Pharmacology) 2009-2015
University of Massachusetts Medical School, Worcester, Massachusetts
Research Advisor: Craig L. Peterson, Ph.D.
Thesis: The solution-state conformation of biochemically reconstituted SIR heterochromatin.

**Research Specialist** 2008-2009
Emory University, Atlanta, Georgia
Research Advisor: Christian P. Larsen, M.D., D.Phil.
Topic: Monitoring viral load in *Rhesus macaque* islet cell transplant recipients.

**Bachelor of Arts** (Biochemistry and Molecular Biology) 2004-2008
Agnes Scott College, Decatur, Georgia
Undergraduate Research Advisor (2006-2007): Timothy S. Finco, Ph.D.
Topic: Transcriptional regulation of the human *LAT* gene.

## Research Support

**K99/R00 Pathway to Independence Award** (K99GM134150/R00GM134150) 2019-2025
National Institute of General Medical Sciences

**F32 Ruth L. Kirschstein National Research Service Award** (F32GM120962) 2017-2019
National Intitute of General Medical Sciences

**T32 Ruth L. Kirschstein National Research Service Award** (T32CA009657) 2016-2017
National Cancer Institute

## Publications

**Swygert, S.G.,*** Lin, D., Portillo-Ledesma, S., Lin, P.Y., Hunt, D.R., Kao, C.F., Schlick, T., Noble, W.S., Tsukiyama, T.* Local chromatin fiber folding represses transcription and loop extrusion in quiescent cells. *eLife* **10:e72062**, (2021). *Corresponding authors.

**Swygert, S.G.**, Tsukiyama, T. Unraveling quiescence-specific repressive chromatin domains. *Current Genetics* **65**, 1145-1151 (2019).

**Swygert, S.G.**, Kim, S., Wu, X., Fu, T., Hsieh, T.H., Rando, O.J., Eisenman, R.N., Shendure, J., McKnight, J.N., Tsukiyama, T. Condensin-dependent chromatin compaction represses transcription globally during quiescence. *Molecular Cell* **73**, 533-546 (2019). Recommended by Faculty of 1000.

**Swygert, S.G.,** Senapati, S., Bolukbasi, M.F., Wolfe, S.A., Lindsay, S., Peterson, C.L. SIR proteins create compact heterochromatin fibers. *Proceedings of the National Academy of Sciences* **115**, 12447-12452 (2018).

Spain M.M., **Swygert S.G.**, Tsukiyama T. Preparation and analysis of *Saccharomyces cerevisiae* quiescent cells. In: Lacorazza H. (eds) *Cellular Quiescence. Methods in Molecular Biology*, vol 1686. Humana Press, New York, NY (2018).

Adkins, N.L., **Swygert, S.G.,** Kaur, P., Niu, H., Grigoryev, S.A., Sung, P., Wang, H., Peterson, C.L. Nucleosome-like, single-stranded DNA (ssDNA)-histone octamer complexes and the implication for DNA double strand break repair**.** *Journal of Biological Chemistry* **292**, 5271-5281 (2017).

Zhao, H., Ghirlando, R., Alfonso, C., Arisaka, F., Attali, I., Bain, D.L., Bakhtina, M.M., Becker, D.F., Bedwell, G.J., Bekdemir, A., Besong, T.M.D., Birck, C., Brautigam, C.A., Brennerman, W., Byron, O., Bzowska, A., Chaires, J.B., Chaton, C.T., Cölfen, H., Connaghan, K.D., Crowley, K.A., Curth, U., Daviter, T., Dean, W.L., Díez, A.I., Ebel, C., Eckert, D.M., Eisele, L.E., Eisenstein, E., England, P., Escalante, C., Fagan, J.A., Fairman, R., Finn, R.M., Fischle, W., de la Torre, J.G., Gor, J., Gustafsson, H., Hall, D., Harding, S.E., Hernández-Cifre, J.G., Herr, A.B., Howell, E.E., Isaac, R.S., Jao, S.C., Jose, D., Kim, S.J., Kokona, B., Kornblatt, J.A., Kosek, D., Krayukhina, E., Krzizike, D., Eric A. Kusznir, E.A., Kwon, H., Larson, A., Laue, T.M., Le Roy, A., Leech, A.P., Lilie, H., Luger, K., Luque-Ortega, J.R., Ma, J., May, C.A., Maynard, E.L., Modrak-Wojcik, A., Mok, Y.F., Mücke, N., Nagel-Steger, L., Narlikar, G.J., Noda, M., Nourse, A., Obsil, T., Park, C.K., Park, J.K., Pawelek, P.D., Perdue, E.E., Perkins, S.J., Perugini, M.A., Peterson, C.L., Peverelli, M.G., Piszczek, G., Prag, G., Prevelige, P.E., Raynal, B.D.E., Rezabkova, L., Richter, K., Ringel, A.E., Rosenberg, R., Rowe, A.J., Rufer, A.C., Scott, D.J., Seravalli, J.G., Solovyova, A.S., Song, R., Staunton, D., Stoddard, C., Stott, K., Strauss, H.M., Streicher, W.W., Sumida, J.P., **Swygert, S.G.**, Szczepanowski, R.H., Tessmer, I., Toth, R.T., Tripathy, A., Uchiyama, S., Uebel, S.F.W., Unzai, S., Gruber, A.V., von Hippel, P.H., Wandrey, C., Wang, S.H., Weitzel, S.E., Wielgus-Kutrowska, B., Wolberger, C., Wolff, M., Wright, E., Wu, Y.S., Wubben, J.M., Schuck, P. A multilaboratory comparison of calibration accuracy and the performance of external references in analytical ultracentrifugation. *PloS One* **10**, e0126420 (2015).

**Swygert, S.G.**, Manning, B.J., Senapati, S., Kaur, P., Lindsay, S., Demeler, B., Peterson, C.L. Solution-state conformation and stoichiometry of yeast Sir3 heterochromatin fibres. *Nature Communications* **5,** 4751 (2014).

**Swygert, S.G.** & Peterson, C.L. Chromatin dynamics: interplay between remodeling enzymes and histone modifications. *Biochimica et Biophysica Acta - Gene Regulatory Mechanisms* **1839**, 728-736 (2014).

Badell, I.R., Russell, M.C., Thompson, P.W., Turner, A.P., Weaver, T.A., Robertson, J.M., Avila, J.G., Cano, J.A., Johnson, B.E., Song, M., Leopardi, F.V., **Swygert, S.**, Strobert, E.A., Ford, M.L., Kirk, A.D., Larsen, C.P. LFA-1-specific therapy prolongs allograft survival in *Rhesus macaques*. *Journal of Clinical Investigation* **120**, 4520-4531 (2010).

Whitten, C.,* **Swygert, S.**,* Butler, S.E.,* Finco T.S. Transcription of the LAT gene is regulated by multiple binding sites for Sp1 and Sp3. *Gene* **413**, 58-66 (2008). *Authors contributed equally.

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**Awards**

**Early career (pre-tenure) faculty excellence in teaching and/or mentoring**
Department of Biochemistry and Molecular Biology, Colorado State Universty 2024

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**Extramural Presentations**

Three-dimensional chromatin architecture represses transcription during quiescence.
(Invited talk) **FASEB Yeast Chromosome and Cell Cycle Meeting** 2024

Three-dimensional chromatin architecture represses transcription during quiescence.
(Invited seminar) **University of Nebraska Medical Center** 2024

Quiescent yeast: a cellular model of chromatin architecture across scales
(Invited talk) **Ewin Schrödinger Institute Chromatin Modeling Meeting** 2024

Condensin-dependent chromatin loop domains are regulated by local chromatin compaction, Rpd3, and Msn2 during quiescence
(Talk) **Penn State Chromatin & Epigenetic Regulation of Transcription Meeting** 2023

Quiescent yeast: an emerging model of 3D chromatin structure.
(Invited talk) **Colorado State University qCMB Symposium** 2022

Local chromatin fiber folding represses transcription and loop extrusion in quiescent cells.
(Invited talk) **Biophysical Society Multiscale Genome Organization Seminar** 2021

Local chromatin fiber folding represses transcription and loop extrusion in quiescent cells.
(Talk) **Colorado Genome Regulation Seminar** 2021

Local chromatin fiber folding represses transcription in quiescent cells.
(Talk) **CSHL Meeting on Epigenetics and Chromatin** 2020
(Poster) **EMBL Transcription and Chromatin Conference** 2020

Global condensin redistribution represses transcription during quiescence.
(Poster) **Penn State Chromatin & Epigenetic Regulation of Transcription Meeting** 2019

Condensin-dependent chromatin compaction represses transcription globally during quiescence.
(Talk) **Gordon Research Conference on Chromatin Structure and Function** 2018
(Poster) **CSHL Meeting on Mechanisms of Eukaryotic Transcription** 2017

Solution-state conformation and stoichiometry of yeast Sir3 heterochromatin fibers.
(Poster) **Gordon Research Conference on Chromatin Structure and Function** 2014

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**Laboratory Mentoring**

**Mentored Graduate Students at Colorado State University**
Teagan Rockwood (Ph.D. in Cell and Molecular Biology) 2024-present
Becky Lafferty (PSM in Biological Data Analytics, Ph.D. in Biochemistry) 2023-present
Ban Al-Kurdi (Ph.D. in Cell and Molecular Biology) 2023-present

**Mentored Graduate Rotation Students at Colorado State University**
Alex Vickers (Biochemistry and Molecular Biology 2024
Teagan Rockwood (Cell and Molecular Biology) 2023
Omar Al-Hanbali (Biochemistry and Molecular Biology) 2023

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| Austin Knight (Biochemistry and Molecular Biology) | 2023 |
| Alina Gaylon (Biochemistry and Molecular Biology) | 2022 |
| Grace Spencer (Biochemistry and Molecular Biology) | 2022 |
| Kayla Stewart (Biochemistry and Molecular Biology) | 2022 |
| Ban Al-Kurdi (Cell and Molecular Biology) | 2022 |
| Tyler Guthrie (Biochemistry and Molecular Biology) | 2022 |

**Mentored Undergraduate Research Assistants at Colorado State University**

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| Scott Elias | 2023-2024 |
| Jason Hernandez (now a post-baccaulaureate in my lab) | 2022-2023 |
| Paige Churchill (now an M.D. student at the Western Atlantic University School of Medicine) | 2022-2023 |

**Mentored Post-baccaulaureates at Colorado State University**

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| Annabel Lewis | 2023-present |
| Jason Hernandez | 2023-present |
| Paige Churchill (now an M.D. student at the Western Atlantic University School of Medicine) | 2023 |

**Mentored Graduate Students at the Fred Hutchinson Cancer Research Center**

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| Alison Greenlaw (completed a Ph.D. in 2023) | 2019-2021 |

**Mentored Post-baccaulaureates at the Fred Hutchinson Cancer Research Center**

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|---|---|
| Dakota Hunt (now a Ph.D. student at the University of Colorado, Boulder) | 2019-2021 |
| Tianhong Fu (completed a Masters at the University of Arizona) | 2015-2019 |
| Keean Braceros (completed a Ph.D. at the University of North Carolina, Chapel Hill) | 2015-2017 |

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## Teaching

**CM515 Computational Cell and Molecular Biology**
Two guest lectures — Spring 2024

**BC401 and BC401H Comprehensive Biochemistry I**
1.3 credits — Fall 2023

**BC565 Molecular Regulation of Cell Function**
0.8 credits — Spring 2023-2024

**CS525 Bioinformatics Algorithms**
Guest lecture and collaborative final project — Spring 2023

**BC499A/B Thesis Mentor**

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|---|---|
| (B) Tess Kilberg | Spring 2024 |
| (B) Abigail Wolfe | Spring 2024 |
| (B) Paige Churchill | Spring 2023 |
| (A) Jason Hernandez | Spring 2023 |

**BC475 Mentored Research**
Jason Hernandez — Spring 2022, Fall 2023

**CM510 Introduction to Cell And Molecular Biology**
Guest lecture — Fall 2022

**NSCI693C Graduate Seminar: Biological Data Analytics**

Guest lecture Spring 2022

**Graduate Core Course Mentor**
University of Massachusetts Medical School, Worcester, Massachusetts 2010-2011

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**Departmental/University Service**

**Departmental Committees**
BMB Data Science Faculty Search Committee 2023-present
BMB Communications Committee 2023-present
qCMB T32 Steering Committee 2023-present
BMB First Year Oral Exam Committee 2023
BMB Graduate Recruitment Committee 2022-present

**Prospective Ph.D. Student Interviews**
Biochemistry and Molecular Biology 2022-2024
Cell and Molecular Biology 2022-2024

**Graduate Admissions Application Review**
Cell and Molecular Biology 2021-2023

**Thesis Committees**
Alex Vickers (Biochemistry and Molecular Biology Ph.D. student, Yao lab) 2024-present
Gabe Spalink (Biochemistry and Molecular Biology Ph.D. student, Santangelo lab) 2024-present
Leah Dixon (Biochemistry and Molecular Biology Ph.D. student, Stargell lab) 2023-present
Alina Galyon (Biochemistry and Molecular Biology Ph.D. student, Santangelo lab) 2023-present
Meg Hemmerlein (Cell and Molecular Biology Ph.D. student, Wilsterman lab) 2023-present
Paul Ulisse (Cell and Molecular Biology Ph.D. student, Santangelo lab) 2023-present
Sreeya Kairamkonda (Undergraduate honors student, Schauer lab) 2023
Bridget Doe (Biochemistry and Molecular Biology Ph.D. student, Stargell lab) 2022-present
Projit Mukherjee (Biochemistry and Molecular Biology Ph.D. student, Schauer lab) 2022-present
Lauren Monroe (Bioengineering Ph.D. student, Gosh lab) 2022-present
Ambika Basu (Biochemistry and Molecular Biology Ph.D. student, Nishimura lab) 2022-present

**Plasmidsaurus**
Manage a plasmid sequencing dropbox used by labs across CSU 2022-present

**Poster Judge**
Colorado Genome Regulation Meeting 2022
qCMB Symposium 2022

**Service at the Fred Hutchinson Cancer Research Center**
Chromatin Club Chair 2016-2020
Postdoc-hosted Seminar Speaker Committee Chair 2018-2020
Scientific Communications Liason Selection Committee 2019
Weintraub Award Review Committee 2017
Scientific Advisory Committee Representative 2017
Summer Undergraduate Research Program Admissions Committee 2015-2016

**Service at the Unversity of Massachusetts Medical School**
Student-Invited Speaker Host 2012-2013

## Professional Service

**Guest Associate Editor**
*PLOS Genetics* 2022-2023

**Peer Reviewer** 2012-present
Reviewed and co-reviewed manuscripts for a variety of journals including: *Nature*, *Cell*, *Molecular Cell*, *Nature Structural and Molecular Biology*, *eLife*, *Genome Research*, *Biophysical Journal, Science Advances, and The Journal of Visualized Experiments*.

## Professional Development

**Creating Inclusive Excellence Program** 2022-2023
21 hour program that seeks to create diversity, equity, and inclusion practitioners

**Supervisor Development Program** 2022
18 hour training program focused on maximizing potential as a supervisor

**GCIM Mentor Well Training** 2022
12 hour training program focused on helping faculty develop mentoring skills

**Safe Zone Training**
3 hour training program for creating inclusive and safe spaces for LGBTQIA+ community members 2022

**Search Chair Training**
4 hour training program for understanding hiring practices at CSU 2022

**Inclusive Syllabi Training**
2 hour training program for creating inclusive syllabi 2022

**Notice & Respond: Assisting Students in Distress**
1.5 hour TILT workshop 2022

## Outreach

**Conference Abstract and Travel Award Review** 2021
Society for Advancement of Chicanos/Hispanics and Native Americans in Science

**Mentor and Poster Session Judge** 2016
Fred Hutchinson Summer Undergraduate Research Program

**Judge** 2016
Northwest Association for Biomedical Research Middle School Essay Contest

**Judge** 2013
Massachusetts State Middle School Science and Engineering Fair

**Volunteer** 2012
Davis Hill Elementary School Math and Science Night, Holden, Massachusetts