

Sarah G. Swygert, Ph.D.

Department of Biochemistry and Molecular Biology
Colorado State University
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Positions and Affiliations

Assistant Professor 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	2022-present
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Education and Training

Postdoctoral Fellow 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.	2015-2021
Doctor of Philosophy (Biochemistry and Molecular Pharmacology) University of Massachusetts Medical School, Worcester, Massachusetts Research Advisor: Craig L. Peterson, Ph.D. Thesis: The solution-state conformation of biochemically reconstituted SIR heterochromatin.	2009-2015
Research Specialist Emory University, Atlanta, Georgia Research Advisor: Christian P. Larsen, M.D., D.Phil. Topic: Monitoring viral load in <i>Rhesus macaque</i> islet cell transplant recipients.	2008-2009
Bachelor of Arts (Biochemistry and Molecular Biology) Agnes Scott College, Decatur, Georgia Undergraduate Research Advisor (2006-2007): Timothy S. Finco, Ph.D. Topic: Transcriptional regulation of the human <i>LAT</i> gene.	2004-2008

Research Support

K99/R00 Pathway to Independence Award (K99GM134150/R00GM134150) National Institute of General Medical Sciences	2019-2025
F32 Ruth L. Kirschstein National Research Service Award (F32GM120962) National Institute of General Medical Sciences	2017-2019
T32 Ruth L. Kirschstein National Research Service Award (T32CA009657) National Cancer Institute	2016-2017

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.

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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. Kuszniir, 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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Extramural Presentations

Three-dimensional chromatin architecture represses transcription during quiescence. (Invited talk) FASEB Yeast Chromosome and Cell Cycle Meeting	upcoming June 2024
Three-dimensional chromatin architecture represses transcription during quiescence. (Invited seminar) University of Nebraska Medical Center	upcoming April 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

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
Austin Knight (Biochemistry and Molecular Biology)	2023
Alina Gaylon (Biochemistry and Molecular Biology)	2022
Grace Spencer (Biochemistry and Molecular Biology)	2022

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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

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

Mentored Post-baccalaureates at Colorado State University

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

Alison Greenlaw (completed a Ph.D. in 2023)	2019-2021
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Mentored Post-baccalaureates at the Fred Hutchinson Cancer Research Center

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
Kean Bracerros (completed a Ph.D. at the University of North Carolina, Chapel Hill)	2015-2017

Teaching

CM515 Computational Cell and Molecular Biology

Two guest lectures	Spring 2024
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BC401 and BC401H Comprehensive Biochemistry I

1.3 credits	Fall 2023
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BC565 Molecular Regulation of Cell Function

0.8 credits	Spring 2023-2024
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CS525 Bioinformatics Algorithms

Guest lecture and collaborative final project	Spring 2023
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BC499A/B Thesis Mentor

(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
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CM510 Introduction to Cell And Molecular Biology

Guest lecture	Fall 2022
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NSCI693C Graduate Seminar: Biological Data Analytics

Guest lecture	Spring 2022
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Graduate Core Course Mentor

University of Massachusetts Medical School, Worcester, Massachusetts

2010-2011

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

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 University 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 2022
3 hour training program for creating inclusive and safe spaces for LGBTQIA+ community members

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

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

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

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
