Curriculum Vitae

Merrick Pierson Smela
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Education

Harvard University 2019 – present
PhD student, joint Chemistry and Chemical Biology / Chemical Biology

University of Cambridge 2018 – 2019
MPhil in Biological Science

University of Minnesota 2015 – 2018
B.S. in Chemistry, B.S. in Biochemistry, and minor in Mathematics
Summa cum laude with high distinction

University of Minnesota 2013 – 2015
(Postsecondary enrollment as a high school student)

Research Experience

Harvard University: 2020 – present
Advisor: Prof. George Church
Currently conducting a variety of research in synthetic biology. My main project is on *in vitro* oogenesis from human pluripotent stem cells. I have developed protocols to generate germline and somatic components of the ovary by transcription factor-mediated differentiation. The transcription factor screening methods that I helped develop were recently published as two papers, and I have also released two preprints describing my work generating ovarian granulosa cells and oogonia.

While labs were shut down due to COVID-19, I also did a side project on computational classification of T-box riboswitches, predicting structures and functional characteristics from sequences and building a database website. This led to a first-author publication.

University of Cambridge: 2018 – 2019
Advisor: Prof. Azim Surani
Investigated the gene regulatory networks involved in primordial germ cell specification, mainly through use of auxin-induced degron gene tagging in a model system derived from human embryonic stem cells. This led to two publications (one first-author). Also conducted a computational chemistry side project on cucurbituril host-guest complexes, leading to an additional publication.

Harvard University: Summer 2017
Advisor: Prof. Emily Balskus
Using both high-throughput screening and rational inhibitor design, found compounds that inhibit the conversion of choline to trimethylamine by gut bacteria.

University of Minnesota: 2015 – 2018
Advisor: Prof. Thomas Hoye
Synthesized substituted dibenzofurans using the HDDA reaction and analyzed them by UV and NMR spectroscopy to determine their suitability for use as active layers in organic LEDs, leading to a patent application. Developed a synthetic strategy using traceless tethers to expand the scope of the HDDA reaction, leading to one first-author and one second-author publication.

Teaching Experience

Horizon Academic Research Program:
Developed and taught a summer course on CRISPR and gene editing 2020 – 2022

Harvard University:
Teaching fellow, Organic Chemistry Lab (CHEM27) Spring 2020

University of Minnesota:
Honors Program Mentor 2016 – 2017
ChemFoundations tutoring leader for Honors Organic Chemistry 2016

Peer-Reviewed Publications

Mandy Lynn, **Merrick Pierson Smela**, Thomas R Hoye. Silicon as a powerful control element in HDDA chemistry: redirection of innate cyclization preferences, functionalizable tethers, and formal bimolecular HDDA reactions. *Chemical Science* **2021**, 12 (41) https://doi.org/10.1039/D1SC04082K
This work was highlighted in Nature Reviews Chemistry.

Christian Kramme, Alexandru M. Plesa, Helen H. Wang, Bennett Wolf, **Merrick Pierson Smela**, Xiaoge Guo, Richie E Kohman, Pranam Chatterjee, George M. Church. An integrated pipeline for mammalian genetic screening. *Cell Reports Methods* **2021,** 1 (6) https://doi.org/10.1016/j.crmeth.2021.100082

Christian Kramme, Alexandru M. Plesa, Helen H. Wang, Bennett Wolf, **Merrick Pierson Smela**, Xiaoge Guo, Richie E Kohman, Pranam Chatterjee, George M. Church. MegaGate: A toxin-less gateway molecular cloning tool. *STAR Protocols* **2021**, 2 (4) https://doi.org/10.1016/j.xpro.2021.100907

Jorge Marchand*, **Merrick Pierson Smela*,** Thomas Jordan, Kamesh Narasimhan, George M. Church. TBDB – A database of structurally annotated T-box riboswitch:tRNA pairs. *Nucleic Acids Research* **2021**, 49 (D1) https://doi.org/10.1093/nar/gkaa721

Anthony Tabet, Thomas Gebhart, Guanglu Wu, Charlie Readman, **Merrick Pierson Smela**, Vijay K. Rana, Cole Baker, Harry Bulstrode, Polina Anikeeva, David H. Rowitch, Oren A. Scherman. Applying support-vector machine learning algorithms toward predicting host–guest interactions with cucurbit[7]uril. *Physical Chemistry Chemical Physics* **2020** https://doi.org/10.1039/c9cp05800a

Anastasiya Sybirna, Walfred W.C. Tang, **Merrick Pierson Smela**, Sabine Dietmann, Wolfram H. Gruhn, Ran Brosh, M. Azim Surani. A critical role of PRDM14 in human primordial germ cell fate revealed by inducible degrons. *Nature Communications* **2020,** 11 (1282) https://doi.org/10.1038/s41467-020-15042-0

Merrick Pierson Smela*, Anastasiya Sybirna*, Fredrick Wong, M. Azim Surani. Testing the role of SOX15 in human primordial germ cell fate. *Wellcome Open Research* **2019,** 4 (122) https://doi.org/10.12688/wellcomeopenres.15381.2

Merrick Pierson Smela and Thomas Hoye. A Traceless Tether Strategy for Achieving Formal Intermolecular Hexadehydro-Diels–Alder Reactions. *Organic Letters* **2018**, 20 (17), pp 5502–5505 https://doi.org/10.1021/acs.orglett.8b02473

**denotes joint first authorship*

Preprints

Merrick Pierson Smela*, Christian Kramme*, Patrick Fortuna, Jessica Adams, Edward Dong, Mutsumi Kobayashi, Garyk Brixi, Emma Tysinger, Richie. E. Kohman, Toshi Shioda, Pranam Chatterjee, George M. Church. Directed Differentiation of Human iPSCs to Functional Ovarian Granulosa-Like Cells via Transcription Factor Overexpression. *bioRxiv* **2022** https://doi.org/10.1101/2022.07.04.498717

Christian Kramme*, **Merrick Pierson Smela***, Bennett Wolf, Patrick R. Fortuna, Garyk Brixi, Kalyan Palepu, Edward Dong, Jessica Adams, Suhaas Bhat, Sabrina Koseki, Emma Tysinger, Teodora Stan, Richie E. Kohman, Songlei Liu, Mutsumi Kobayashi,

Toshi Shioda, George M. Church, Pranam Chatterjee. Efficient Human Germ Cell Specification from Stem Cells via Combinatorial Expression of Transcription Factors. *bioRxiv* **2022** https://doi.org/10.1101/2022.07.11.499564

Other Publications, Patents, and Presentations

Merrick Pierson Smela, Sutharshan Ganesan, and Gavriel Kleinwaks. "Universal Influenza Vaccine Summary" (Report prepared for 1 Day Sooner, January 2021)

Merrick Pierson Smela, Gavriel Kleinwaks, Nicole Sexton, and Ginny Schmit. "FAQ: Long-Term Effects of COVID-19" (Report prepared for 1 Day Sooner, September 2020)

Merrick Pierson Smela. "Investigating Human Primordial Germ Cell Specification by Manipulation of Regulatory Proteins" (MPhil thesis presentation, given August 2019 at the Gurdon Institute)

Thomas Hoye, Feng Xu, Sean Ross, Xiao Xiao, and **Merrick Pierson Smela.** "Compounds and Devices Containing Such Compounds." (US Patent Application on compounds for OLED active layers. Number WO2018014028, filed 2017 July 17, published 2018 January 18.)

Merrick Pierson Smela. "Removable Linkers for the Hexadehydro-Diels-Alder Reaction" (Undergraduate senior thesis presentation, given December 2017 at the University of Minnesota Chemistry department)

Merrick Pierson Smela. "Developing Inhibitors of Bacterial Choline Metabolism" (Oral presentation, given August 2017 as part of the Harvard Amgen Scholars program.)

Honors and Awards

Harvard University

NIH F31 Fellowship	2022
Nominated for Regeneron Prize for Creative Innovation	2021
NSF Graduate Research Fellowship	2018
Amgen Scholar	2017

University of Cambridge

Churchill Scholarship	2018

University of Minnesota, Twin Cities:

Astronaut Scholarship	2017
Goldwater Scholarship (Honorable Mention)	2017
Sigma Xi	2017
UROP Grant Recipient	2016, 2017
Heisig-Gleysteen Fellowship	2016
J. Lewis Maynard Memorial Prize in Advanced Inorganic Chemistry	2016
Bentson Family Scholarship	2015 – 2018
Gold Scholar Award	2015 – 2018
Cyrus and Mary Field Scholarship	2015 – 2018
Dean's List	2015 – 2018

Notable awards during PSEO period:

US Chemistry Olympiad, High Honors	2015
National Merit Scholarship	2015
Harvard Prize Book Award	2014

Leadership and Service

1 Day Sooner

Consultant on COVID-19 and vaccine research	2020 – 2021

Harvard University

Emerging Tech Policy Network	2019 – 2020

University of Minnesota

Alpha Chi Sigma	*2015 – 2018*
Treasurer	2017 – 2018
Executive Board member	2017 – 2018
Public Relations Alchemist *(head of outreach)*	2017
Representative to the Science and Engineering Student Board	2016
Outreach Committee member	2016 – 2018
University of Minnesota iGEM Team	*2017 – 2018*
American Chemical Society Student Chapter	*2016 – 2018*
Treasurer	2016 – 2018
Synthetic Biology Society	*2016 – 2018*
Officer	2017 – 2018