

## MELINDA BONNIE FAGAN

Department of Philosophy  
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Carolyn Tanner Irish Humanities  
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Salt Lake City, UT 84112

### Areas of Specialization:

Philosophy of Science, Philosophy of Biology, Epistemology

### Areas of Competence:

History of Science, Philosophy of Social Science

### Employment

**Sterling McMurrin Full Professor of Philosophy**, July 2021 to present  
University of Utah, Salt Lake City, Utah

**Sterling McMurrin Associate Professor of Philosophy**, July 2014 to June 2021  
University of Utah, Salt Lake City, Utah

**Assistant Professor of Philosophy**, July 2007 to June 2014  
Rice University, Houston, Texas

### Education

**Ph.D., History and Philosophy of Science**, minor in Philosophy, June 2007  
Indiana University, Bloomington, Indiana  
Dissertation: *Integrative Pragmatism and Scientific Inquiry*  
Committee: Elisabeth Lloyd, Colin Allen, Jordi Cat, Tom Gieryn, Jutta Schickore, Fred Schmitt

**M.A., History and Philosophy of Science**, September 2005  
Indiana University, Bloomington, Indiana

**M.A., Philosophy**, May 2002  
University of Texas at Austin, Austin, Texas  
Master's Report: *Mechanistic and Reductive Explanation in Biology: a Comparison of Recent Accounts*.  
Advisors: Robert Causey, Fred Kronz

**Ph.D., Biological Sciences**, January 1998  
Stanford University, Stanford, California  
Dissertation: *Botryllus schlosseri historecognition locus and HSP70 genes*.  
Committee: Irving Weissman, David Epel, Patricia Jones, George Somero, Virginia Walbot

**B.A., Biology**, *Summa cum laude*, Highest Honors, June 1992  
Williams College, Williamstown, Massachusetts  
Thesis: *An Analysis of the Mating System of a Marginal Population of Lonicera hirsuta (Caprifoliaceae)*  
Advisor: Henry Art

### Fellowships and Awards

Sabbatical Research, University of Utah (AY2021-2022)

Career Champions Award, University of Utah, Student Career Development (Spring 2020)  
 University Research Council Faculty Fellowship (teaching leave S2019)  
 Research Travel Award, Center for Latin American Studies, University of Utah (S2017)  
 International Travel Grant, College of Humanities, University of Utah (S2016, S2017)  
 National Science Foundation, Scholar's Award (AY2014-2015)  
*Choice* Award for Outstanding Academic Titles (January 2014)  
 Workshop on Underrepresentation of Women in Philosophy, Funding Award (Spring 2013)  
 Visiting Fellowship, Center for Philosophy of Science, University of Pittsburgh (Fall 2013)  
 Humanities Research Center, Faculty Innovation Fund Research Fellowship, 2010-2012  
 Humanities Research Center Collaborative Research Fellowship, Rice University 2009-2010  
 Mosle Research Award, Rice University, 2007-2013  
 Louise McNutt Dissertation Year Fellowship, Indiana University, 2006-2007  
 Doctoral Dissertation Improvement Grant, National Science Foundation, 2006-2007  
 Mikal Lynn Sousa Award for Excellence in Graduate Scholarship, Indiana University, 2006  
 Norwood Russell Hanson Prize, Best Graduate Student Paper in History and Philosophy of  
 Science, Indiana University, 2005  
 Chancellor's Fellowship, Indiana University, 2002-2007  
 Richard S. Westfall Travel Fellowship, Department of HPS, Indiana University, 2004  
 Women in Science Program Travel Award, Indiana University, 2004  
 University Fellowship, University of Texas at Austin, 2000-2002  
 Howard Hughes Predoctoral Fellowship, Howard Hughes Medical Institute, 1993-1997  
 Dwight Botanical Prize, Williams College, 1992  
 Barry M. Goldwater Science Scholarship, Williams College, 1990

## I. RESEARCH

### Publications

#### Books

*Philosophy of Stem Cell Biology: Knowledge in Flesh and Blood*. Palgrave-Macmillan, 2013.

*Choice* Award for Outstanding Academic Titles (January 2014).

Reviewed in:

O'Malley, M. (2014) Exemplary philosophy of science. *Studies in History and Philosophy of Biological and Biomedical Sciences* 45: 149-152

Currie, A. (2014) *British Journal of Philosophy of Science* doi: 10.1093/bjps/axu032  
 (published online: November 10, 2014)

Ioannidis, S. (2015) The philosophy of stem cells. *Metascience* 24: 285–288

New Books in Philosophy Interview 2014/05/15 (<http://newbooksinphilosophy.com/>)

*Individuation, Process, and Scientific Practices*. (co-edited volume) with Ruey-Lin Chen, Otávio Bueno, Oxford University Press, 2018.

Reviewed in:

Skilling, D (2021) Consolidating a new approach in the philosophy of science.  
*Metascience* 30: 111-114.

*Stem Cells: Elements* Cambridge University Press, May 2021. Available online at:

<https://www.cambridge.org/core/elements/stem-cells/84A99143E4AF000F28F86700726FBCF0>

### Journal Articles

Pre-implantation genetic testing: decisional factors to accept or decline among in vitro fertilization patients. Co-authored (MBF is 4<sup>th</sup> author) with Brandy Lamb, Erin Johnson, Leslie Francis, Naomi Riches, Isabella Canada, Alena Wilson, Amber Mathiesen, Maya Sabatello, Shawn Gurtcheff, Erica Johnstone, and Erin Rothwell. *Journal of Assisted Reproduction and Genetics*. 35: 1605–1612, 2018 < <https://rdcu.be/3ZJe> >

Stem cell lineages: between cell and organism. *Philosophy and Theory in Biology* 9, 2017. Special Issue: *The Ontologies of Living Beings*. <<http://www.philosophyandtheoryinbiology.org/>>

Explanation, multiple perspectives, and unification. *Balkan Journal of Philosophy* 9: 19-34, 2017. Invited paper, Special Issue ‘Explanation and Understanding’

Interventionist omissions: a critical study of mechanistic explanation in biology. *Philosophy of Science* 83: 1082-1097, 2016.

Generative models: human embryonic stem cells and multiple modeling relations. *Studies in History and Philosophy of Science* 56: 122-134, 2016.

Stem cells and systems models: clashing views of explanation. *Synthese* 193: 873-907, 2016.

Collaborative explanation and biological mechanisms. *Studies in History and Philosophy of Science* 52: 67-78, 2015 (Special Section: Explanation in Scientific Practice).

Crucial stem cell experiments? Stem cells, uncertainty, and single-cell experiments. *Theoria* 30: 183-205, 2015. (Special Section: Philosophy of Experiment)

Explanatory integration challenges in evolutionary systems biology. With Sara Green, Johannes Jaeger. *Biological Theory* 10: 18-35, 2015 (Thematic issue: Evolutionary Systems Biology).

Philosophy of stem cell biology: an introduction. *Philosophy Compass* 8: 1147-1158, 2013.

The stem cell uncertainty principle. *Philosophy of Science* 80: 945-957, 2013.

Collective scientific knowledge. *Philosophy Compass* 7: 821-831, 2012.

The joint account of mechanistic explanation. *Philosophy of Science* 79: 448-472, 2012.

Waddington redux: models and explanation in stem cell and systems biology. *Biology and Philosophy* 27: 179-213, 2012.

Materia mathematica: models in stem cell biology. *Journal for Experimental and Theoretical Artificial Intelligence* 24: 315-327, 2012.

Standards in history: evaluating success in stem cell experiments. In: Henk W. de Regt, Stephan Hartmann, and Samir Okasha (eds.) *European Philosophy of Science Association Proceedings: Amsterdam 2009*, 43-53, 2011.

Social experiments in stem cell biology. *Perspectives on Science* 19: 235-262, 2011.

Is there collective scientific knowledge? Arguments from explanation. *The Philosophical Quarterly*, 61: 247-269, 2011.

Social construction revisited. *Philosophy of Science* 77: 92-116, 2010.

Stems and standards: social interaction in the search for blood stem cells. *Journal of the History of*

*Biology* 43: 67-109, 2010.

Fleck and the social constitution of scientific objectivity. *Studies in History and Philosophy of Biological and Biomedical Sciences* 40: 272-285, 2009.

Wallace, Darwin and the practice of natural history. *Journal of the History of Biology* 40: 601-635, 2007.

The search for the hematopoietic stem cell: social interaction and epistemic success in immunology. *Studies in History and Philosophy of Biological and Biomedical Sciences* 38: 217-237, 2007.

### **Book Chapters**

Organoids: a vital thread in a generative fabric of models. Published in German as: Organoide: Ein wesentliches Element in einem generativen Modellgefüge (trans: Anja Pichl), in: *Organoide. Ihre Bedeutung für Forschung, Medizin und Gesellschaft (Organoids. Their importance for research, medicine and society)*, edited by Sina Bartfeld, Hannah Schickl, Cantas Alev, Bon-Kyoung Koo, Anja Pichl, Angela Osterheider, Lilian Marx-Stölting (English version available upon request), 2020, Berlin-Brandenburg Academy of Sciences and Humanities, 149-170

Stem cells and nanomaterials as experimental kinds. In: Bursten, J (ed) *Perspectives on Classification in Synthetic Sciences: Unnatural Kinds*. Taylor and Francis, 2019, 114-135

Interdisciplinarity, perspectives, and explanation. In: Massimi, M, and McCoy, CD (eds.) *Understanding perspectivism: Scientific Challenges and Methodological Prospects*, Taylor and Francis, 2020, 28-49

Stem cell biology: a conceptual overview. In: Hauskeller, C, Manzeschke, A, Pichl, A (eds) *The Matrix of Stem Cell Research: An Approach to Thinking of Science and Society*. Routledge, Genetics and Society series. (2019)

Introduction. (co-authored with Chen, R-L, and Bueno, O). In: Ruey-Lin Chen, Otávio Bueno. Melinda Bonnie Fagan (eds). *Individuation across Experimental and Theoretical Sciences*. Oxford University Press, 2018.

Individuality, organisms, and cell differentiation. In: Otávio Bueno, Ruey-Lin Chen, and Melinda Bonnie Fagan (eds). *Individuation across Experimental and Theoretical Sciences*. Oxford University Press, 2018, 114-136.

Explanation, unification, and mechanisms. In: Massimi, M, Romeijn, J-W, and Schurz, G (eds.) *EPSA2015: Selected Papers. European Studies in Philosophy of Science 5*. Springer, 137-152, 2017.

Interdisciplinarity, philosophy, and systems biology. In: Green, Sara (ed.) *Philosophy of Systems Biology*. Springer, 87-97, 2017.

Pathways to the clinic: cancer stem cells and challenges for translational research. In Bonniolo, G, and Nathan, M (eds) *Philosophy of Molecular Medicine. Foundational Issues in Research and Practice*. New York: Routledge, 165-191, 2017.

Cell and body: individuals in stem cell biology. In: Guay, A, and Pradeu, T (eds) *Individuals Across the Sciences*. Oxford University Press, 122-143, 2016.

Explanatory interdependence: the case of stem cell reprogramming. In: Pierre-Alain Braillard and Christophe Malaterre (eds.) *Explanation in Biology. An Enquiry into the Diversity of Explanatory Patterns in the Life Sciences*. Dordrecht, Springer, 387-412, 2015.

Do groups have scientific knowledge? In: Sara Chant, Frank Hindriks, and Gerhard Preyer (eds.) *From Individual to Collective Intentionality: New Essays*, Oxford University Press, 163-186, 2014.

Experimenting communities in stem cell biology: exemplars and interdisciplinarity. In: Hanne Andersen, Dennis Dieks, Wenceslao J. Gonzalez, Thomas Uebel, Gregory Wheeler (eds.) *New Challenges to Philosophy of Science*, Springer, 195-210, 2013.

Social epistemology of stem cell research: history, philosophy and experiment. In: Mauskopf, Seymour, and Schmaltz, Tad (eds.) *Integrating History and Philosophy of Science. Boston Studies in Philosophy of Science* 263 (Springer), 221-239, 2011.

Theory and practice in the field: Wallace's work in natural history, 1844-1858. In: Smith, Charles H. and Beccaloni, George (eds.) *Natural Selection and Beyond: The Intellectual Legacy of Alfred Russel Wallace*, Oxford University Press, 66-90, 2008.

### **Reviews and Commentaries**

Commentary on 'How causal are microbiomes?' by Lynch, Parke and O'Malley (2019), *Biology and Philosophy* 34: 58 (target article commentary) published December 2019

Epigenetic lacunae: response to Meloni's *Political Biology*. *History of the Human Sciences* 31: 109-15, 2018

Review of Tauber (2017) *Immunity: the Evolution of an Idea*. *Notre Dame Philosophical Reviews*, December 2017

Stem cell lacunae: review of *Biological Relatives* (Franklin, 2013) and *Good Science* (Thompson, 2013). *Metascience* 24: 147-153, 2015.

Collective Vision of Objects of Inquiry: Some Preliminary Thoughts. *Social Epistemology Review and Reply Collective* 3 (3): 27-29, 2014. <http://wp.me/P1Bfg0-Y9>

Social mechanisms and explanatory pluralism: Reflections on the Persson-Little-Chuang debate. *Social Epistemology Review and Reply Collective* 2 (7): 6-11, 2013.

Human experiments: waves and rifts in synthetic biology. Review of P. Rabinow and G. Bennett, *Designing Human Practices*. (2012, Chicago). *Metascience* 22: 371-374, 2013.

Review of Steve Fuller's *Science* (2010, Acumen). *Notre Dame Philosophical Reviews*, February 2011.

Review of Heather Douglas' *Science, Policy and the Value-Free Ideal* (2007, Pittsburgh UP). *Notre Dame Philosophical Reviews*, December 2009.

Fagan, Melinda, Forber, Patrick, García Deister, Vivette, Haber, Matthew H., Hamilton, Andrew, and Yamashita, Grant. Meeting Report: First ISHPSSB Off-Year Workshop. *Biology and Philosophy* 20(4): 927-929, 2005.

### **Biology Articles**

Liu, J., Shu, W., Fagan, M.B., Nunberg, J.H., and Lu, M. Structural and functional analysis of the HIV-1 gp41 core containing an Ile573 to Thr substitution: implications for membrane fusion. *Biochemistry* 40: 2797-2807, 2001.

Lu, M., Stoller, M.O., Wang, S., Liu, J., Fagan, M.B., and Nunberg, J.H. Structural and functional analysis of interhelical interactions in the Human Immunodeficiency Virus Type 1 gp41 envelope glycoprotein by alanine-scanning mutagenesis. *Journal of Virology* 75: 11146-11156, 2001.

Fagan M.B., Weissman I L. Linkage analysis of *HSP70* genes and historecognition locus in *Botryllus schlosseri*. *Immunogenetics* 47: 468-476, 1998.

Fagan M.B., Weissman I L. Characterization of a polymorphic protein localized to vascular epithelium in *Botryllus schlosseri*: role in tunic synthesis? *Molecular Marine Biology and Biotechnology* 7: 204-213, 1998.

Fagan M.B., Weissman I L. Linked *HSP70* genes in the colonial protochordate *Botryllus schlosseri*. *Hereditas* 127: 25-35, 1997.

Fagan M.B., Weissman I L. Sequence and characterization of two *HSP70* genes in the colonial protochordate *Botryllus schlosseri*. *Immunogenetics* 44: 134-142, 1996.

## Work in Progress

### Under review:

with Jane Maienschein, 'Theories of Development' (SEP entry, completed 3/15/21)

### In preparation:

*Collaborative explanation* (monograph, in preparation)

'Stem cell biology' (Routledge Encyclopedia of Philosophy, to be completed 2021)

How does the immune system work? Answers for non-experts.

## Presentations

9th International Congress Of Immunology. San Francisco, CA, USA, July 23-29, 1995.  
"HSP70 and historecognition in *Botryllus schlosseri*." (poster presentation)

5<sup>th</sup> International Workshop on MHC Evolution, Visby, Gotland, Sweden, May 22-26, 1997.  
"Linkage analysis of *HSP70* genes in the colonial protochordate *Botryllus schlosseri*."

2004 Vienna Summer University: Scientific World Conceptions, "The Quest for Objectivity."  
University of Vienna, Austria, July 19-30, 2004. "The collector and the species-man."

California Academy of Sciences, Colloquium on History and Philosophy of Science, San Francisco, CA, USA, March 10, 2005. "Science as action."

University of Minnesota Graduate Student Conference: Beyond Dichotomies, Across the Boundaries: Interdisciplinary Investigations of Dynamic Interactions in Biological and Social Sciences. Minneapolis, MN, USA, April 14-17, 2005. "Science as action: the individual-social dichotomy in social epistemology."

2005 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, University of Guelph, Ontario, Canada, July 13-17, 2005. "Shared goals and interdisciplinary interactions in contemporary immunology."

Norwood Russell Hanson Prize Lecture, Department of History and Philosophy of Science, Indiana University, January 20, 2005. “Darwin, Wallace, and the practice of natural history.”

Southwest Colloquium in the History and Philosophy of the Life Sciences, University of California at Davis, CA, March 31-April 2, 2006. “Science as social action: the search for the hematopoietic stem cell.”

Philosophy/History & Philosophy of Science Miniconference on Philosophical and Scientific Methodologies, Indiana University, Bloomington, IN, May 8, 2006. Commentary on: Swain, Alexander and Weinberg “The instability of philosophical intuitions: running hot & cold on truetemp.”

Seminar in Social Ethics and Normative Theory, Stanford University, Stanford, CA, May 19, 2006. “Science as social action: a hybrid account.”

California Academy of Sciences, Colloquium on History and Philosophy of Science, San Francisco, CA, USA, October 5, 2006. “Integrative pragmatism and scientific inquiry.”

Department of History and Philosophy of Science, Indiana University, January 12, 2007. ‘Science as social action: how to construct scientific objectivity.’

Department of Philosophy, University of California Santa Cruz, January 18, 2007. ‘Science as social action: how to construct scientific objectivity.’

Department of Philosophy, Rice University, January 26, 2007. ‘Science as social action: how to construct scientific objectivity.’

Department of Philosophy, University of California at Davis, January 29, 2007. ‘Science as social action: how to construct scientific objectivity.’

Program in Science and Technology Studies, University of California at Davis, January 30, 2007. ‘The search for the hematopoietic stem cell: immunology and epistemic success.’

Science and Philosophy Symposium, University of Stony Brook, New York, NY, March 10, 2007. ‘Social epistemology of stem cell research.’

2007 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, University of Exeter, Exeter, UK, July 25-29, 2007. ‘Stems and standards: social mechanisms for managing complexity in immunology.’

Integrated History and Philosophy of Science (&HPS1), Center for Philosophy of Science, University of Pittsburgh, Pittsburgh, PA, October 13, 2007. ‘Social epistemology of scientific inquiry: beyond case studies in history vs. philosophy.’

Department of Philosophy, University of Western Ontario, October 26, 2007. ‘Stems and standards: scientific objectivity and the search for the blood stem cell.’

Darwin Day 2008, Secular Students Association, Rice University, Houston, TX, February 9, 2008. ‘The co-discoverers: Darwin and Wallace.’

Pragmatism and Naturalism Workshop, Tilburg Center for Logic and Philosophy of Science, Tilburg, The Netherlands, May 8, 2008. ‘Integrative Pragmatism as social epistemology of Science.’

History of Philosophy of Science (HOPOS) 2008, University of British Columbia, Vancouver, Canada, June 19, 2008. ‘Fleck and the social constitution of scientific objectivity.’

British Society for the Philosophy of Science. University of St. Andrews, Scotland, UK, July 11, 2008. ‘Social epistemology and science.’ (invited plenary talk)

Weissman Lab Retreat, Rocky Mountain Labs, Hamilton, MT, July 21, 2008. ‘Philosophy of science: knowledge, experiment and society.’

2008 Biochemistry and Cell Biology Departmental Retreat, Rice University, October 13, 2008. ‘Bridging gaps: philosophy of science, philosophy of biology.’

Stem Cell Short Course, Baker Institute, Rice University, January 8, 2009. ‘Artificial gametes and reproductive cloning.’ (Round-table discussion)

Seminar in Medical Humanities, Department of Philosophy and the Medical Humanities, Indiana University, Indianapolis, March 27, 2009. ‘The search for the blood stem cell: a case study in social epistemology of science.’

Workshop on Methods in the Life Sciences, Department of History and Philosophy of Science, Indiana University, Bloomington, March 28, 2009. ‘Methods talk’ and social epistemology of experiment.’ (invited talk)

Society for the Philosophy of Science in Practice, University of Minnesota, Minneapolis, MN, June 18, 2009. ‘Collaboration, toward an integrative philosophy of scientific practice.’

British Society for the Philosophy of Science Conference, University of East Anglia, Norwich, UK, July 13, 2009. ‘Is there collective scientific knowledge? Arguments from explanation.’

UCLA Center for Society and Genetics, Los Angeles, October 1, 2009. ‘Social experiments: models and methods in stem cell biology.’ (invited talk)

European Philosophy of Science Association, Free University Amsterdam, Netherlands, October 23, 2009. ‘Experimental standards: stemness, interaction and epistemic success.’

Brown Bag Seminar, Humanities Research Center, Rice University, Houston, TX, November 4, 2009. ‘Philosophy of stem cell biology.’

American Philosophical Association Central Division Meeting, Chicago, IL, February 20, 2010. ‘Is there collective scientific knowledge?’

Panelist, ‘50 Years of HPSC.’ Department of History and Philosophy of Science, Indiana University, Bloomington 50<sup>th</sup> Anniversary Conference, September 23, 2010.

Integrated History and Philosophy of Science (&HPS3) Indiana University, Bloomington, September 26, 2010, ‘Philosophy of stem cell biology: an integrated approach.’

Epistemology of Modeling and Simulation, Pittsburgh, PA, April 2, 2011, ‘Waddington Redux: two approaches to modeling stem cells.’

American Philosophical Association, Pacific Division Meeting, San Diego, CA, April 22, 2011 ‘Collaboration and experiment in studies of biomedicine.’ (panel discussion)

Society for the Philosophy of Science in Practice, Exeter, UK, June 24, 2011. ‘Waddington redux: models of cell reprogramming.’

2011 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, University of Utah, Salt Lake City, July 12, 2011. ‘Applying history and philosophy of science to stem cell research.’

Interdisciplinarity and Systems Biology Workshop, Aarhus University, Aarhus, Denmark,



August 18, 2011. ‘Experimenting communities in stem cell biology: exemplars and interdisciplinarity.’ (invited talk)

Baker Institute for Public Policy, Rice University, September 14, 2011. Discussion of *Knowledge in Flesh and Blood: The Philosophy of Stem Cell Biology* (Part I).

Panel discussion, RUSP ‘Applying to Graduate School.’ Rice University, September 20, 2011.

American Philosophical Association, Pacific Division Meeting, Seattle, WA, April 4, 2012. ‘Thinking again about mechanisms.’ (colloquium paper)

Individuals Across the Sciences, Sorbonne, Paris, May 20, 2012. ‘Cell and body: individuals in stem cell biology.’

Philosophy of Science Association, San Diego CA, November 15, 2012. ‘The stem cell uncertainty principle.’ (contributed paper)

Mellon-Sawyer Seminar on Energy Humanities, ‘Reply to Keller.’ Rice University, December 5, 2012.

Embryo Physics Course, ‘Waddington redux: simple abstract models and integrative biological explanations.’ (Second Life® <http://embryogenesisexplained.com/course>) February 6, 2013.

American Philosophical Association, Central Division Meeting, New Orleans, LA, February 21, 2013. ‘On knowing how I feel.’ (symposium chair)

Guest Lecture, Experimental Biology and the Future of Medicine (BIOC 447/547) March 19, 2013. ‘Philosophy and stem cell biology.’

Cultures of Energy, 2<sup>nd</sup> Annual Spring Research Symposium, Rice University, Houston TX, April 20, 2013. ‘Modeling and imaging climate change and pollution.’ (session chair)

International Society for Stem Cell Research Annual Meeting, Boston, MA, June 12, 2013. ‘Collaboration in stem cell research: a philosophical account.’ (poster)

British Society for the Philosophy of Science. University of Exeter, UK, July 5, 2013. ‘Stem cell pluralism: resolving the ‘stemness’ debate.’

2013 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, Montpellier, France, July 8, 2013. ‘Leaping from Waddington’s landscape: premature theorizing in stem cell biology’ (paper)

2013 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, Montpellier, France, July 11, 2013. Commentary on Part I of ‘Frameworks and representations of cells and molecules/proteins/genes.’

29th Altenberg Workshop in Theoretical Biology, Konrad Lorenz Institute, Altenberg, Austria, September 8, 2013. ‘Concerns about Evolutionary Systems Biology.’ (invited talk)

Center for Philosophy of Science Colloquium, University of Pittsburgh, Pittsburgh, PA. September 17, 2013. ‘Collaborative explanation.’

Wesleyan University, Middletown CT, November 20, 2013. ‘Philosophy of stem cell biology: models, experiments, and explanation.’ (invited talk, Philosophy Department and Science and

Society Program)

University of Utah, Salt Lake City, UT, December 9, 2013. ‘Collaborative explanation and biological mechanisms.’ (invited talk, Philosophy)

American Philosophical Association, Eastern Division Meeting, Baltimore, MD, December 29, 2013. ‘Collaborative explanation and biological mechanisms.’ (invited session: ‘Explanation and Scientific Practice’)

University of California, San Diego, January 17, 2014. ‘Collaborative explanation and biological mechanisms.’ (invited talk, Philosophy)

Scientia Institute Power of Ideas Speaker Series, February 11, 2014. ‘Collaboration.’ (invited short talk)

Diversity in Philosophy Workshop, Rice University Department of Philosophy and Humanities Research Center, March 21, 2014. Carrie Figdor: ‘Diversity in philosophy: data, initiatives, and common concerns.’ (session chair)

Philosophy of Scientific Experimentation 4, University of Pittsburgh, Pittsburgh, PA. April 11, 2014. ‘Crucial stem cell experiments? An objection to the uncertainty principle for stem cells.’

Modeling and Simulation 6, University of Notre Dame, May 9-11, 2014, ‘Generative models: human embryonic stem cells and multiplicity of modeling relations.’

Philosophy of Science Association, Chicago IL, November 8, 2014. ‘Interventionist omissions.’ (symposium paper)

Individuality Conference, Cheng Chung University, Chiayi, Taiwan, December 9, 2014. ‘Stem cell individuality and differentiation.’ (invited talk)

University of Colorado, Boulder CO, February 23, 2015. ‘Explanation, unification, and mechanisms.’ (invited talk)

Intermountain West Graduate Student Conference, University of Utah, UT, March 26, 2015. ‘Explanation, unification, and mechanisms.’ (plenary lecture)

American Philosophical Association, Pacific Division Meeting, Vancouver, BC, Canada, April 5, 2015. ‘Author Meets Critics Symposium: James Tabery’s ‘Beyond Versus: the Struggle to Understand the Interaction of Nature and Nurture’ (The MIT Press, 2014).’ (symposium chair)

Investigating Interdisciplinary Practice: Methodological Challenges, Academy of Finland Centre of Excellence in the Philosophy of the Social Sciences, University of Helsinki, June 17, 2015. ‘Stem cells and systems models: obstacles to interdisciplinary explanation.’

Society for the Philosophy of Science in Practice, Aarhus University, Aarhus, Denmark, June 24, 2015. ‘Collaboration and explanatory models.’

2015 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, Montreal, Canada, July 8, 2015. ‘Stem cell lineages: past, present and future.’

2015 Wilderness Post-ISHPSSB meeting, Ampersand Mountain, NY, July 12, 2015. ‘Multilevel unifying explanations.’

European Philosophy of Science Association, Düsseldorf, Germany. September 23, 2015. 'Explanation, unification, and mechanisms.'

Worlds Apart: Aristotelian and Contemporary Engagement in Metaphysics and the Philosophy of Biology, University of Utah Department of Philosophy, April 14, 2016. 'From stem cells to species: potentiality, transformation, and individuality in contemporary philosophy of biology.' (invited roundtable discussion)

(Re)engineering Biology, Center for Philosophy of Science, University of Pittsburgh, Pittsburgh, PA, April 15, 2016. 'Reprogramming and the Repressilator.'

IHPST Cancer and Philosophy, Paris, France, April 28, 2016. 'Pathways to the clinic: cancer stem cells and models of development.' (invited talk)

University of Bordeaux, Seminar, May 2, 2016. 'Stem cell models: cell individuality, development, and levels of organization.' (invited talk)

Unnatural Kinds: workshop on classification in the synthetic sciences. San Francisco State University, May 17, 2016. 'What kind of a thing is a stem cell? And other questions' (invited talk)

Society for the Philosophy of Science in Practice, Rowan University, Glassboro New Jersey, June 18, 2016. 'Explanation and collaborative practices.'

History of Philosophy of Science (HOPOS) 2016, University of Minnesota, Minneapolis MN, June 25, 2016. 'The operon model and scientific explanation.'

Integrated History and Philosophy of Science (&HPS6), University of Edinburgh UK, July 3, 2016. 'The operon model and scientific explanation.'

8<sup>th</sup> Pittsburgh Fellows Quadrennial Conference, Lund Sweden, July 11, 2016. 'Explanation and collaboration.'

13<sup>th</sup> Burian-MacNabb Distinguished Lecture, Virginia Tech, Blacksburg, VA, September 30, 2016. 'Stem cell experiments and models of development.' (invited talk)

Center for Law and Biosciences Brown Bag Seminar, S. J. Quinney College of Law, University of Utah, October 20, 2016. 'CRISPR and biological practices.' (invited talk)

History and Philosophy of Science Colloquium Series, University of Pittsburgh, November 11, 2016. 'Explanation and multiple perspectives.' (invited talk)

Living Machines lecture, Copenhagen University, Denmark, March 31, 2017. 'Collaborative explanation, unification, and mechanisms.' (invited talk)

2017 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, São Paulo, Brazil, July 18, 2017. 'Stem cells and lineage models of development.'

European Philosophy of Science Association, Exeter, UK. September 7, 2017. 'Success and failure among the stem cells: connecting biology and philosophy.' (symposium paper)

Salt Lake Oasis, Salt Lake City, Utah, September 24, 2017. 'What is a stem cell?' (invited talk)

American Philosophical Association, Pacific Division Meeting, San Diego, CA, March 29, 2018.

'Invited Symposium: Epistemology and Injustice in Stem Cell Clinics' (organizer and chair)

Invited workshop, 'Drawing the Line: Assessing and Analyzing the US Rule on Embryo Research from Ethical, Political and Scientific Perspectives,' Rice University, Houston TX, May 23-24, 2018

'Reprogramming and the Repressilator.' Interdisciplinary Workshop and Summer School, 'Varieties of Experiment and Measurement in Technoscience: The Case of Synthetic Biology,' Darmstadt, Germany, September 3, 2018 (invited talk and workshop)

'Stem cell lineages, potential, and models of development.' Philosophy of Biology Colloquium, University of Cincinnati, September 28, 2018 (invited talk)

'Reversing pathology: Mintz's teratocarcinoma experiments as stem cell models.' Philosophy of Cancer Biology, Bordeaux, October 15, 2018 (invited talk)

'Stem cells, lineages, and processes.' Boston Colloquium in Philosophy of Science 'A Processual Revolution in Biology,' October 29, 2018 (invited talk)

Philosophy of Science Association, Seattle, WA, November 1-4, 2018. 'Perspectives on experiment: philosophy of science in practice as interdisciplinary research.' (contributed paper)

American Philosophical Association, Pacific Division Meeting, Vancouver, BC, April 18, 2019. 'Trust, accountability, and fake news' (chair)

'Explanatory particularism and unity of science.' Philosophy Seminar Series, University of Washington, May 24, 2019 (invited talk)

'Cell lineages, potential, and models of development' □ Seaman Lecture / Biological Seminar, University of Idaho, September 20, 2019 (invited talk)

'Feminist philosophy of science' University of Utah Philosophy Club, University of Utah, October 22, 2019 (informal invited talk)

'Explanatory particularism' Intermountain Philosophy Conference, Utah Valley University, October 25, 2019 (invited talk; keynote)

'Selecting Journals & Conferences to Submit Work or Attend' Graduate Student Practicum, February 10, 2020 (grad student mentoring)

'Stem cell biology: an introduction,' guest lecture and discussion, Philosophy of Biology (Brn Mawr), February 26, 2020 (invited guest lecture/Q&A)

Session Chair, POBAMz (Philosophy of Biology at the Mountains on Zoom), June 25, 2020.

'Teaching history and philosophy of science at University of Utah' Copenhagen-US workshop on teaching history and philosophy of science (remote workshop), June 30-July 1, 2020

'Explanatory particularism and interdisciplinary understanding.' Philosophy Seminar Series, Indiana University, Bloomington, March 25, 2021 (invited talk)

'Engaged philosophy of science.' Engaged Philosophy: Building Bridges, online workshop of Philosophy Departments of Michigan State University and University of Utah, April 16, 2021 (lightning talk)

'Stem cells...' Slovenia, March 2022 (zoom presentation)

## **Research Appointments**

Undergraduate Research Assistant, Department of Biology, Williams College, Summer 1991 (Joan Edwards, Henry Art: field ecology of *Lonicera hirsuta* mating system)

Laboratory Technician, Ares Advanced Technology, Randolph, MA (September 1992 to December 1992 (cytokine purification and characterization)

Doctoral Fellow, Weissman Laboratory, Stanford University, January 1994 to December 1997 (comparative immunology, evolution of historecognition)

Post-Doctoral Fellow, Nunberg Laboratory, University of Montana, Missoula, MT, April 1999 to May 2000 (HIV-1 vaccine research).

Research Assistant, Department of Philosophy, University of Texas at Austin, Spring 2001 (Daniel Bonevac: formal logic)

Research Assistant, Department of HPSC, Indiana University, June 2004 (Elisabeth Lloyd: genic selectionism)

Visiting Fellow, Center for the Philosophy of Science, University of Pittsburgh, Fall 2013.

## **II. TEACHING**

### **Courses taught:**

Associate Professor, Department of Philosophy, University of Utah

Philosophy of Biology (Fall 2015, Fall 2018, Spring 2021)

Topics in Philosophy of Science (Fall 2015, Spring 2018, Fall 2019, Fall 2020)

Bioethics (Spring 2016)

Theory of Knowledge (Spring 2016, Fall 2016, Fall 2017, Fall 2020)

Research Ethics (Fall 2016)

History and Philosophy of Science (Fall 2017, Fall 2018, Spring 2020)

Senior Seminar (Spring 2018)

Feminist Philosophy of Science (Fall 2019, Spring 2021)

Assistant Professor, Department of Philosophy, Rice University

Introduction to Philosophy of Science (Fall 2007, Fall 2010, Fall 2011, Fall 2012)

Theory of Knowledge (Fall 2007, Spring 2009 & 2011, Fall 2011 & 2012, Spring 2014)

Philosophy of Biology (Spring 2008, Spring 2011)

Philosophy of Science (Spring 2009, Spring 2010)

Seminar in Social Epistemology (Spring 2008)

Seminar in Pragmatism: Rational Practices (Fall 2008)

Seminar in Philosophy of Science (Fall 2010, Spring 2013, Spring 2014)

Philosophical Challenges and Engineering Applications of Stem Cells (Spring 2010)  
(co-taught with Prof. Ann Saterbak, Dept. of Bioengineering, Rice University)

Instructor, Department of History and Philosophy of Science, Indiana University

Scientific Reasoning (Fall 2003, Spring 2004, Fall 2004, Spring 2005)

Bioethics (Fall 2005, Spring 2006)

Teaching Assistant, Philosophy Department, University of Texas at Austin

Philosophy of Science (Fall 2000)  
Human Nature (Fall 2001)  
Formal Logic (Spring 2002)

Teaching Assistant, Department of Biological Sciences, Stanford University  
Introductory Ecology (Spring 1993)  
Introductory Biochemistry and Molecular Biology (Fall 1995)  
Molecular and Cellular Immunology (Winter 1996)

**Student Advising:**

Undergraduate Research Opportunities Program Mentor: Melvin Davila Martinez (Fall 2018)  
Undergraduate Honors Thesis: Julia Bursten (2007-08); Ashley Allen (reader; 2008);  
Carolyn Branecky (2012-13)  
Independent Research and Reading: Alex Gorischek (Fall 2009)  
Graduate Research: Jacob Kolman (Rice, 2009-2013), Heather Phillips (Rice, 2008-10), Michael Barkasi (Rice, 2011), Jennifer Bulcock (Rice, 2011-2015), Richard Figueroa (Utah, 2016-2018), Daniel Molter (Utah, dissertation committee 2016-2019), Robert Kok (Utah, Fall 2017-), Eric Blix (Utah English, dissertation committee Fall 2017-), Quining Guo (Utah, Fall 2020 advising committee)  
Sponsor, student-taught course 'History and perception of self-injury' (Raasha Suleman, S2013)

**Pedagogic activities:**

CTLE workshop: Inclusivity in the Online Classroom (webinar), April 14, 2020  
Copenhagen-US network on teaching history and philosophy of science: member from 2019;  
workshop participant (video-conference), June 30-July 1, 2020  
CTLE Bootcamp: Preparing Online or Digital Components for your Class, July 6-10, 2020

**III. PROFESSIONAL ACTIVITIES**

**University and College**

College of Humanities Diversity Task Force (Spring 2019- Spring 2021)  
College of Humanities Faculty Awards Committee (AY2017-2018)  
Graduate Funding Success Workshop, 'What do review panels look for?' April 12, 2017  
Graduate Research Fellowship Awards Committee (Spring 2017-Spring 2018)  
College of Humanities Career Development Committee (2015-2017)  
Steering Committee, Center for Energy and Environmental Research in the Human Sciences, Rice University (Spring 2013-2014)  
Co-coordinator, Workshop on the Underrepresentation of Women in Philosophy (2013-2014)  
Mellon-Sawyer Seminar, Cultures of Energy (2012-2013)  
Participant, Religion in Public Life Program seminars and workshops (Fall 2011, Spring 2013)  
Member, Cultures of Energy Working Group (2011-2012)  
Member, Humanities Research Center Financial Advisory Committee (2010-2013)  
Member, Graduate Council (AY 2009-2010)  
Coordinator, Cultural Studies of Science and Technology workshop (2009-2012)  
Faculty Sponsor, Secular Students of Rice (2008-2009)

Faculty Associate, Jones College (2008-2014)

Scientia Institute Fellow, organizing committee (2008-2009), program committee (2009-2010), Member (2013-2014)

## Department

Associate Chair, Philosophy Department (AY2019-2020)

Chair, Subcommittee on Promotion and Tenure (F2018)

Department of Philosophy Undergraduate Student Committee (F2017-S2019)

Department of Philosophy Graduate Student Committee (AY 2015-2016, F2016)

Department of Philosophy Recruitment/Hiring Committee (AY 2015-2016)

Why So Few? Committee on Gender Diversity in Philosophy (2012-2014)

Undergraduate Transfer Credit Officer (2009-2014)

Graduate Admissions Committee, Rice Dept. of Philosophy (2009, 2011, 2013)

Tsanoff Committee for Undergraduate Prize in Philosophy (2007-2008, 2009-2010, 2012-2013)

Faculty Search Committees, Rice Dept. of Philosophy (2007-2009, 2012-2013)

Student Representative, Search Committee (Spring 2004, Department of History and Philosophy of Science, Indiana University).

## Professional

### Organizing and Committees

Program Committee, Philosophy of Science Association, 2020/2021 meeting (Baltimore)

ISHPSSB Ad Hoc Committee on Respectful Behavior (May 2019-May 2020)

Program Committee, Philosophy of Biology at the Mountains (POBAM) May 17-18, 2018; June 2020

Nominating Committee, Philosophy of Science Association (1/2018-12/2019)

Program Committee, American Philosophical Association, Pacific Division (2017-2020)

Associate Editor, *European Journal for Philosophy of Science* (July 2017-2021)

Program Committee, Models and Simulations 8, University of South Carolina (2018 meeting)

Editorial Board, *Biology and Philosophy* (from December 2016)

Program Committee, European Philosophy of Science Association, 2017 Meeting (Exeter)

Editorial Board, *Journal of Medicine and Philosophy* (from June 2016)

Editorial Board, *Stanford Encyclopedia of Philosophy*, Philosophy of Biology Section (2014-present)

Program Committee, Philosophy of Science Association, 2014 Meeting (Chicago)

Organizing Committee, Diversity in Philosophy Workshop, Rice University, March 21, 2014.

Organizing Committee, Women in Philosophy Workshop, Rice University, March 9, 2012

Editorial Board, *Social Epistemology* (from March 2011)

Panel Member, National Science Foundation

Advisory Committee representative, Qatar Stem Cell Workshop on Science and Policy “Saving Lives or Crossing Lines,” Doha, Qatar, March 15, 2009

Organizer, *Kansas v. Darwin* screening and discussion, Rice University, February 18 & 19, 2009

Advisory Committee, 2<sup>nd</sup> ISHPSSB Off-Year Workshop, “Future Directions in Biology Studies” (FDIBS), Indiana University, Bloomington, IN, USA, July 26-30, 2006

Organizer, “Perspectives on Immunology” Session (July 16), 2005 Meeting of the International Society for the History, Philosophy, and Social Studies of Biology, University of Guelph, Ontario, Canada, July 13-17, 2005

Co-organizer, 1<sup>st</sup> ISHPSSB Off-Year Workshop, “Future Directions in ISH” (FDISH), University of San Francisco, CA, USA, September 23–26, 2004

#### Refereeing and Reviews

*Biology and Philosophy*, *BioScience*, *British Journal of Philosophy of Science*, *Episteme*, *Erkenntnis*, *European Journal of Philosophy of Science*, *History of the Human Sciences*, *History and Philosophy of the Life Sciences*, *International Studies in the Philosophy of Science*, *Journal of Medicine and Philosophy*, *Perspectives on Science*, *Philosophical Quarterly*, *Philosophy of Science*, *Philosophy Compass*, *Social Epistemology*, *Studies in History and Philosophy of Biological & Biomedical Sciences*, *Studies in History and Philosophy of Science*, *Synthese*, *Synthesis Philosophica*, *Theoria*, *Acta Ophthalmologica*, *The Kennedy Institute of Ethics Journal*, Société de Philosophie des Sciences, the National Science Foundation, the Israel Science Foundation, the European Research Council, and The Wellcome Trust.

#### Societies

*Phi Beta Kappa* (1991)

*Sigma Xi* (1992)

Philosophy of Science Association (2000-present)

PSA Women’s Caucus (2008-present)

International Society for History, Philosophy and Social Studies of Biology (2000-present)

American Philosophical Association (2006-present)

International Society for History of Philosophy of Science (2008-2016)

International Society for Stem Cell Research (2009-present)

Society for Philosophy of Science in Practice (2009-present)

European Philosophy of Science Association (2009-present)

Joint Caucus of Socially Engaged Philosophers and Historians of Science (2012-2020)