

Eric M. Erkenbrack

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EDUCATION

Ph.D., Biology, California Institute of Technology, 2016

B.S., Biology / B.A., Philosophy, Tufts University, (magna cum laude), 2008

Junior college studies at Normandale Community College, Minnesota, 2003-2005

APPOINTMENTS

2018 – Charles H. Revson Senior Fellow in Biomedical Sciences, Yale University

2015 – 2018 Postdoctoral Associate, Department of Ecology and Evolutionary Biology, Yale University

PUBLICATIONS

First-author publications = 9 (16) | Google Scholar h-index = 7 | Google Scholar citations = 190

2019 **Erkenbrack E.M.**, Thompson, J.R. Cell type phylogenetics informs the evolutionary origin of the echinoderm larval skeletogenic cell identity. *Communications Biology*. Accepted.

2019 Wagner, G.P., **Erkenbrack E.M.**, Love, A.C. Stress-Induced Evolutionary Innovation: A mechanism for the origin of cell types. *BioEssays* 41(4): 1-9.
<http://dx.doi.org/10.1002/bies.201800188>

2019 **Erkenbrack E.M.**, Croce J., Miranda E., Gautam S., Martinez-Bartolome M., Yaguchi S. Range R.C. Whole mount in situ hybridization techniques for analysis of the spatial distribution of mRNAs in sea urchin embryos and early larvae. *Methods in Cell Biology*, vol 151. Academic Press. 177-196.

2018 **Erkenbrack E.M.**, Davidson E.H., Peter I.S. Conserved regulatory state expression controlled by divergent developmental gene regulatory networks in echinoids. *Development* 145(24): 1-11. <http://dx.doi.org/10.1242/dev.167288>

2018 **Erkenbrack E.M.**, Maziarz J.D., Griffith O.W., Liang C., Chavan A.R., Nnamani M.C., Wagner G.P. The mammalian decidual cell evolved from a cellular stress response. *PLOS Biology* 16(8): e2005594. <http://dx.doi.org/10.1371/journal.pbio.2005594>

2018 Rytönen K.T., **Erkenbrack E.M.**, Poutanen M., Elo L.L., Pavlicev M., Wagner G.P. Decidualization of human endometrial stromal fibroblasts is a multi-phasic process involving distinct transcriptional programs. *Reproductive Sciences: In Press*.

2018 **Erkenbrack E.M.** Notch-mediated lateral inhibition is an evolutionarily conserved mechanism patterning the ectoderm of echinoids. *Development Genes and Evolution* 228(1): 1-11.
<http://dx.doi.org/10.1007/s00427-017-0599-y>

2017 Thompson J.R., **Erkenbrack E.M.**, Hinman V.F., McCauley B.S., Petsios E., and Bottjer D.J. Paleogenomics of echinoids reveals an ancient origin for the double negative gate specification of micromeres in sea urchins. *Proc Natl Acad Sci U S A* 114(23):5870-5877.
<http://dx.doi.org/10.1073/pnas.1610603114>

- 2017 **Erkenbrack E.M.**, Petsios E. A conserved role for VEGF signaling in specification of homologous mesenchymal cell types positioned at spatially distinct developmental addresses in early development of sea urchins. *J. Exp. Zool. Part B: Mol Dev Evol* 328(5): 423-432. <http://dx.doi.org/10.1002/jez.b.22743>
- 2016 **Erkenbrack E.M.** Divergence of ectodermal and mesodermal gene regulatory network linkages in early development of sea urchins. *Proc Natl Acad Sci U S A* 113(46):E7202-E7211. <http://dx.doi.org/10.1073/pnas.1612820113>
- 2016 Nnamni M.C., Ganguly S., **Erkenbrack E.M.**, Lynch V.J., Mizoue L.S., Tong Y., Darling H.L., Fuxreiter M., Meiler J., and Wagner G.P. A derived allosteric switch underlies the evolution of conditional cooperativity between HOXA11 and FOXO1. *Cell Reports* 15(10):2097-2108. <http://dx.doi.org/10.1016/j.celrep.2016.04.088>
- 2016 **Erkenbrack E.M.**, Ako-Asare K., Miller E., Tekelenburg S., Thompson J.R., and Romano L. Ancestral state reconstruction by comparative analysis of a GRN kernel operating in echinoderms. *Development Genes and Evolution* 226(1):37-45. <http://dx.doi.org/10.1007/s00427-015-0527-y>
- 2015 Thompson J.R., Petsios E., Davidson E.H., **Erkenbrack E.M.**, Gao F., and Bottjer D.J. Reorganization of sea urchin gene regulatory networks at least 268 million years ago as revealed by oldest fossil cidaroid echinoid. *Scientific Reports* 5:15541. <http://dx.doi.org/10.1038/srep15541>
- 2015 **Erkenbrack E.M.** and Davidson E.H. Evolutionary rewiring of gene regulatory networks linkages at divergence of the echinoid subclasses. *Proc Natl Acad Sci U S A* 112(30):E4075-E4084. <http://dx.doi.org/10.1073/pnas.1509845112>
- 2015 Gao F., Thompson J.R., Petsios E., **Erkenbrack E.M.**, Moats R.A., Bottjer D.J., and Davidson E.H. Juvenile skeletogenesis in anciently diverged sea urchin clades. *Developmental Biology* 400(1):148-158. <http://dx.doi.org/10.1016/j.ydbio.2015.01.017>
- 2012 Schrey S., **Erkenbrack E.M.**, Fruh E., Fengler S., Hommel K., Horlacher N., Schulz D., Ecke M., Kulik A., Fiedler H-P., Hampp R., and Tarkka M. Production of fungal and bacterial growth modulating secondary metabolites is widespread among mycorrhiza-associated streptomycetes. *BMC Microbiology* 12:164-178. <http://dx.doi.org/10.1186/1471-2180-12-164>

MANUSCRIPTS (Submitted/In Review)

- 2019 Gupta K., Afzal J., Maziarz J.D., Hamidzadeh A., Liang C., **Erkenbrack E.M.**, Nam H., Haeger J-D., Pfarrer C., Hoang T., Ott T., Spencer T., Pavlicev M., Antczak D., Levchenko A., Wagner G.P. The evolution of placental invasion and cancer metastasis are causally linked. *Nature Ecology and Evolution*: In Review.

FELLOWSHIPS, AWARDS, AND GRANTS

Fellowships and Awards

- 2018 Charles H. Revson Senior Fellowship in Biomedical Sciences, The Charles H. Revson Foundation, New York, USA (\$200,512)
- 2013 John and Ursula Kanel Charitable Foundation Scholar, Kanel Foundation, California, USA (\$4700)
- 2007 Thomas Harrison and Emily Leonard Carmichael Prize Scholarship, Department of Biology, Tufts University (\$1140)
- 2006 DAAD Undergraduate Research Fellow, Eberhard Karls University of Tübingen, Germany (\$9000)

- 2006 DAAD Summer Research Fellow, Max Planck Institute for Plant Breeding Research, Cologne, Germany (\$4500)
- 2005 NSF REU Summer Research Fellow, Tufts University (\$6200)
- 2004 Jason Horak Memorial Scholarship, Normandale Community College (\$1500)

Research & Travel Grants

- 2017 Yale Systems Biology Institute, Pioneer Project Seed Grant (\$15,000)
- 2016 Postdoctoral SDB Travel Award, Society for Developmental Biology, Boston, USA (\$400)

PRESENTATIONS

Conference Presentations (First Author)

- 2019 To be or not to be homologous: Evolution of cell type identity of the echinoderm larval skeletogenic cell. Society for Integrative and Comparative Biology, Tampa Bay, USA
- 2018 Cells, fossils, and embryos: Using phylogenetic comparative methods to understand how specialized cell types have changed in deep time. Geological Society of America, Indianapolis, USA
- 2016 Comparative analysis of global regulatory gene deployment reveals tempo and mode of alterations to developmental gene regulatory networks in echinoids. Society for Developmental Biology, Boston, USA.
- 2014 Delta-Notch signaling and HesC mediate the spatial confinement of the skeletogenic-specific regulatory factor *alx1* to micromere-descendants in *Eucidaris tribuloides*. Developmental Biology of the Sea Urchin XXII. Woods Hole, USA.
- 2013 Understanding how development and morphology are encoded in the genome: Early deployment of gene regulatory networks in two distantly-related sea urchins is indicative of major genomic rewiring. Society for Molecular Biology and Evolution, Chicago, USA.
- 2012 Embryonic development of the slate pencil urchin *Eucidaris tribuloides*: Re-booting research on this interesting cidaroid. Developmental Biology of the Sea Urchin XXI. Woods Hole, USA.

Invited Presentations (First Author)

- 2018 Divergence of ectodermal and mesodermal gene regulatory network linkages in early development of sea urchins. Developmental Biology of the Sea Urchin, Woods Hole, USA
- 2018 The role of a classical cellular stress response in the evolution of a novel cell type in eutherian mammals. Society for Integrative and Comparative Biology, San Francisco, USA
- 2016 Embryos and Ancestors: Reconstructing gene regulatory networks and embryonic development in ancestral echinoids. Geological Society of America, Denver, USA

TEACHING & MENTORSHIP EXPERIENCE

Teaching Assistant, California Institute of Technology

Summary: Under the advisement of Professor Davidson, my responsibilities included critically reviewing syllabi and lectures, preparing talks and leading weekly sections for undergrads, critically reviewing and grading the written component of final exams

- 2013 Bi 204: Evolution of the Animal Body Plan, Prof. Eric Davidson, California Institute of Technology, Graduate/Upper-level undergraduate course.
- 2012 Bi 182: Developmental Gene Regulation and Evolution of Animals, Prof. Eric Davidson, California Institute of Technology, Graduate/Upper-level undergraduate course.
- 2011 Bi 204: Evolution of the Animal Body Plan, Prof. Eric Davidson, California Institute of Technology, Graduate/Upper-level undergraduate course.

2010 Bi 182: Developmental Gene Regulation and Evolution of Animals, Prof. Eric Davidson, California Institute of Technology, Graduate/Upper-level undergraduate course.

Mentoring in the laboratory

Summary: 8 total, (2) high school students**, (5) undergraduates*, (2) graduate students

2018 Edwin Neumann*; **2016** Emily Criscuolo**, Himay Dharani**; **2014** Jeff Thompson; **2013** Elizabeth Petsios, Ellora Sarkar*; **2011** Rebekkah Kitto*, Neal Desai*; 2010 Elise Cai

PROFESSIONAL SERVICE & OUTREACH

Journal Referee

Genome Biology and Evolution, Journal of Experimental Zoology Part B, Molecular Biology and Evolution

Conference/Symposium Activities

2019 Session Chair, *Character Development and Evolution*, Society for Integrative and Comparative Biology

2018 Co-organizer, Yale Evo-Devo Symposium

2018 Plenary Session Chair, Developmental Biology of the Sea Urchin XXV

Website & Social Media Outreach

Since 2013, I have curated a personal website that aims to highlight my research projects and advertise recent media interest in publications. Additionally, I actively engage in outreach on social media, e.g. Twitter, where I translate and summarize my research output for a broader audience.

ACADEMIC MEMBERSHIPS

Society for Developmental Biology, Pan-American Society for Evolutionary Developmental Biology, Society for Integrative & Comparative Biology, American Association for the Advancement of Science, Geological Society of America

PROFESSIONAL REFERENCES

Professor Günter P. Wagner

Alison Richard Professor of Ecology and Evolutionary Biology
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Yale University
850 West Campus Dr
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Professor Ellen V. Rothenberg

Albert Billings Ruddock Professor of Biology
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Professor David J. Bottjer

Department of Earth Sciences & Co-Director Center for Chinese Fossil Discoveries
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Email: dbottjer@usc.edu