Jacob M. Daane

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Research Interests

Research interests focus on using natural morphological and physiological diversity to address fundamental questions in genetics, evolution, development and disease through the combined application of comparative genomics and experimental analysis in model organisms.

Education

PhD	2016	Harvard University. Cambridge, MA PhD in Biological and Biomedical Sciences
BS	2010	University of Wisconsin-Madison. Madison, WI Major in Molecular Biology

Professional Experience

2020-present	Associate Research Scientist, Northeastern University Marine Science Center. Nahant, MA Advisor: Dr. Bill Detrich Research: Comparative genomics in fishes and zebrafish developmental genetics
2016-2020	Postdoctoral Researcher, Northeastern University Marine Science Center. Nahant, MA Advisor: Dr. Bill Detrich Research: Evolutionary medicine, adaptive radiation and fish comparative genomics
2010-2016	Graduate Student, Harvard University. Cambridge, MA Advisor: Dr. Matthew Harris Research: Genetics of proportional growth in the zebrafish fin and genomic approaches toward understanding natural variation in non-model systems
2006-2010	Undergraduate Research, University of Wisconsin-Madison. Madison, WI Advisor: Dr. Karen Downs Research: Development and patterning of the mouse umbilical cord

Funding & Awards ($USD)

2019	Harvard Medical School Fund for Genetics of Climate Change, $100,000
2017-2019	American Heart Association Postdoctoral Fellowship (17POST33660801), $103,300
2014	National Science Foundation Doctoral Dissertation Improvement Grant (DEB-1407092), $13,000
2012-2015	National Science Foundation Graduate Research Fellowship, $132,000
2009	Barry M. Goldwater Scholar, $7,500
2009	UW-Madison Bookstore Award for senior honors thesis, $1,000
2008	UW-Madison Hilldale Undergraduate Research Fellowship, $4,000

Publications

Daane JM, Auvinet J, Stoebenau A, Yergeau D, Harris MP and Detrich HW III. Developmental constraint shaped genome evolution and erythrocyte loss in Antarctic fishes following paleoclimate change. (2020). *PLoS Genetics.* 16(10):e1009173

Harris MP, **Daane JM**, Lanni J. Veiled mirrors: fish fins giving insight into size regulation. (2020). *Wiley Interdisciplinary Reviews: Developmental Biology* e381

Li C, Barton C, Henke K, **Daane JM**, Caetano-Lopes J, Tanguay R and Harris MP. Celsr1a is essential for tissue homeostasis and onset of aging phenotypes in the zebrafish**.** (2020). *eLife* 9:e50523.

Daane JM, Giordano D, Coppola D, di Prisco G, Detrich HW III and Verde C. Adaptations to environmental change: globin superfamily evolution in Antarctic fishes. (2019). *Marine Genomics* 49:100724*.*

Daane JM, Dornburg A, Smits P, MacGuigan D, Hawkins B, Near TJ, Detrich HW III* and Harris MP*. (2019) Historical contingency shapes adaptive radiation in Antarctic fishes. *Nature Ecology & Evolution* 3: 1102-1109.

Daane JM, Lanni J, Rothenberg I, Seebohm G, Higdon CW, Johnson SL and Harris MP. (2018). Bioelectric-calcineurin signaling module regulates allometric growth and size of the zebrafish fin. *Scientific Reports* 8:10391.

Henke K, **Daane JM**, Hawkins MB, Dooley CM, Busch-Nentwich EM, Stemple DL and Harris MP. (2017). Genetic Screen for Postembryonic Development in the Zebrafish (Danio rerio): Dominant Mutations Affecting Adult Form. *Genetics* 207:609-623.

Daane JM, Rohner N, Konstantinidis P, Djuranovic S and Harris MP. (2016). Parallelism and epistasis in skeletal evolution identified through use of phylogenomic mapping strategies. *Mol Biol. Evol.* 33:162-173.

Perathoner S, **Daane JM**, Henrion U, Seebohm G, Lanni SL, Higdon CW, Johnson SL, Nüsslein-Volhard C and Harris MP. (2014). Bioelectric signaling regulates size in zebrafish fins. *PLoS Genetics*, 10(1):e1004080**.**

Daane JM and Downs KM. (2011). Hedgehog signaling in the posterior region of the mouse gastrula suggests manifold roles in the fetal-umbilical connection and posterior morphogenesis. *Dev. Dynamics*, 240: 2175–2193.

Daane JM, Enders AC and Downs KM (2011). Mesothelium of the murine allantois exhibits distinct regional properties. *J. Morpholo*gy, 272: 536–556.

Forthcoming manuscripts

Daane JM, Blum N, Lanni J, Iovine MK, Higdon CW, Johnson SL, Lovejoy NR and Harris MP. Novel regulators of growth implicated in the evolution of proportion in flying fish. *bioRxiv.* doi:10.1101/2021.03.05.434157

Treaster S, **Daane JM** and Harris MP. Refining Convergent Rate Analysis with Topology in Mammalian Longevity and Marine Transitions. *bioRxiv*. doi: 10.1101/2021.03.06.434197.

Daane JM and Detrich HW III. Adaptations and Diversity of Antarctic Fishes. *Annual Review of Animal Biosciences. In review.*

Products & Resources

Genomic sequence and variance data for:

- 2 cyprinids, *Phoxinellus alepidotus* and *Telestes ukliva* (https://doi.org/10.5281/zenodo.1435076)
- 44 species of notothenioid fishes and two outgroup species, *Percophis brasiliensis* and *Percina caprodes* (https://doi.org/10.5281/zenodo.2628936)
- 39 species of Beloniformes, including flying fish, needlefish and halfbeaks. (https://doi.org/10.5281/zenodo.5082979)
- 24 species of Baikal sculpins (posting pending)
- 8 Perciformes representing broad diversity, including a freshwater sculpin (*Cottus bairdi*), an eelpout (*Opthalmolyscus amerensis*), a snailfish (*Paraliparis meganchus*), a stickleback (*Apeltes quadracus*), three serranids (*Pseudanthias pascalus*, *Centropristis striata*, *Diploprion bifasciatum*), and a darter (*Percina brevicauda*) (posting pending)
- 8 Salmoniformes (posting pending)

Conferences & Presentations

Daane JM, Harris MP and Detrich HW III. 2021. 16th International Zebrafish Conference. Online (*talk*)

Daane JM, Harris MP and Detrich HW III. 2021. 33rd Cold Spring Harbor meeting on The Biology of Genomes. Online (*poster*)

Daane JM, Harris MP and Detrich HW III. 2021. US Antarctic Science Meeting. Online (*talk*)

Daane JM. 2021. Lehigh University. Bethlehem, PA. Online (*invited talk)*

Daane JM. 2021. University of North Florida. Jacksonville, FL. Online (*invited talk)*

Daane JM, Auvinet J, Peters M, Harris MP and Detrich HW III. 2020. *Scientific Committee on Antarctic Research (SCAR) 2020*. Online (*talk*)

Daane JM, Auvinet J, Stoebenau A, Yergeau D, Harris MP and Detrich HW III. 2020. *Society for Developmental Biology*. Online (*talk*)

Daane JM. 2020. *University of Houston*. Houston, TX (*invited talk*)

Daane JM. 2020. *University at Albany*. Albany, NY (*invited talk*)

Daane JM. 2019. *Boston University*. Boston, MA (*invited talk*)

Daane JM. 2019. *Mount Desert Island Biological Laboratory*. Bar Harbor, ME (*invited talk*)

Daane JM, Dornburg A, Near TJ, Harris MP, Detrich HW III. 2019. *Pan-American Society for Evolutionary Developmental Biology*. Miami, FL (*poster*). **1st Place Poster Award** (postdoc category).

Daane JM, Dornburg A, Near TJ, Harris MP, Detrich HW III. 2019. *Gordon Research Conference on Ecological and Evolutionary Genomics*. Manchester, NH (*poster*)

Daane JM, Dornburg A, Near TJ, Harris MP, Detrich HW III. 2019. *Society for Developmental Biology*. Boston, MA (*poster*)

Daane JM. 2019. *University of California-Irvine*. Irvine, CA (*invited talk*)

Daane JM, Rohner N, Konstantinidis P, Djuranovic S, Harris MP. 2015. *Pan-American Society for Evolutionary Developmental Biology*. Berkeley, CA (*poster*)

Daane JM, Rohner N, Konstantinidis P, Djuranovic S, Harris MP. 2015. *Gordon Research Conference on Molecular Mechanisms in Evolution*. Easton, MA (*poster*)

Daane JM and Harris MP. 2014. *International Conference on Zebrafish Development and Genetics*. Madison, WI (*talk*)

Daane JM and Downs KM. 2009. *Society for Developmental Biology*. San Francisco, CA (*poster*)

Daane JM and Downs KM. 2008. *Society for Developmental Biology*. Philadelphia, PA (*poster*)

Active Collaborative Projects

Dr. Thomas Near, Yale University
Genomics to understand broad fish diversity and radiation across Perciformes
Dr. Alex Dornburg, North Carolina Museum of Natural Sciences
Comparative genomics of Antarctic fishes and genomic analysis of introgression
Dr. Nathan Lovejoy, University of Toronto-Scarborough
Genetics of allometry in evolution of Beloniformes
Dr. Michael Sandel, University of West-Alabama
Phylogenomics of Lake Baikal sculpins
Dr. Andres Aguilar, California State University-Los Angeles
Phylogenomics of Lake Baikal sculpins
Dr. Mackenzie Gerringer, SUNY Ganesco
Physiological adaptations of abyssal fishes – eelpout and snailfishes
Dr. Matthew Harris, Harvard Medical School
Broad sequencing approaches applied to fishes.
Dr. Stephen Treaster, postdoctoral researcher at Harvard Medical School
Phylogenomics of aging: rockfishes and gobies. Phylogenetic tool development

Teaching & Volunteer Experience

Mentor to undergraduate researchers. Boston, MA *2017-2020*
Working with Northeastern undergraduates to help develop research skills.
Experience in teaching genomics and bioinformatics approaches as well as wet-lab training
Harvard CB306qc - Theory and Science of Teaching. Boston, MA *2014*
Participated in course that assesses the effectiveness and implementation of evidence based pedagogical methods in higher education
HMS Kids. Boston, MA *2011*
Led science demonstrations and taught science lessons at summer program for at-risk youth
Biocore Outreach Ambassadors. Madison, WI *2007-2009*
Travel monthly to elementary or middle school classrooms to work with and help teachers teach science in a hypothesis oriented manner by having students design/run experiments.
Greater University Tutoring Service. Madison, WI *2007-2008*
Tutored general and organic chemistry to UW-Madison undergraduates

References

Postdoctoral Research Advisor
Dr. Bill Detrich (Professor)
Northeastern University, Department of Marine and Environmental Sciences
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PhD Advisor
Dr. Matthew Harris (Associate Professor)
Harvard Medical School, Department of Genetics
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Undergraduate Research Advisor
Dr. Karen Downs (Professor)
University of Wisconsin-Madison, Department of Cell & Regenerative Biology
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