

# MELISSA C. KEINATH

## *Curriculum Vitae*

Carnegie Institute of Science  
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## EDUCATION

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- 2012-2017      **University of Kentucky**, Department of Biology  
Ph.D., Molecular Biology, Advisor: Jeremiah J. Smith, Ph.D
- 2006-2010      **University of Kentucky**  
B.S., Biology; minor in German

## PUBLICATIONS

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### Articles– peer-reviewed

- Keinath M.C.**, Timoshevskiy V.A., Timoshevskaya N.Y., Voss S.R., Smith, J.J. Miniscule Differences in the Sex Chromosomes of the giant genome of a salamander, *Ambystoma mexicanum*. *Scientific Reports*. 8:17882. Dec 14, 2018. Doi: 10.1038/s41598-018-36209-2
- Smith J.J., Timoshevskaya N., Ye C. Holt, C., **Keinath M.C.**, Parker H.J., Cook M.E., Hess J.E., Narum S.R., Lamanna F., Kaessmann H., Timoshveskiy V.A., Waterbury C.K.M., Saraceno C., Wiedemann L.M., Robb S.M.C., Baker C., Eichler E.E., Hockman D., Sauka-Spengler T., Yandell M., Krumlauf R., Elgar G. & Amemiya C.T. The sea lamprey provides insights into programmed genome rearrangement and vertebrate evolution. *Nature Genetics*. 50: 270-277 (2018). 22. Jan. 2018. doi:10.1038/s41588-017-0036-1
- Timoshevskiy V.A., Herdy J.R., **Keinath M.C.**, Smith, J.J. Cellular and Molecular Features of Developmentally Programmed Genome Rearrangement in a Vertebrate (Sea Lamprey: *Petromyzon marinus*). *PLOS Genetics*. Jun 24, 2016 doi: 10.1371/journal.pgen.1006103
- Keinath M.C.**, Voss S.R., Tsonis, P.A., Smith, J.J. A Linkage Map for the Newt *Notophthalmus viridescens*: Insights in Vertebrate Genome and Chromosome Evolution. *Developmental Biology*. Jun 2, 2016. doi: 10.1016/j.ydbio.2016.05.027
- Keinath M.C.**, Timoshevskiy V.A., Timoshevskaya N.Y., Tsonis P.A., Voss S.R., Smith, J.J. Initial characterization of the large genome of the salamander *Ambystoma mexicanum* using shotgun and laser capture chromosome sequencing. *Scientific Reports*. 5:16413. Nov 10, 2015. doi: 10.1038/srep16413.
- Smith J. J., **Keinath M. C.** The sea lamprey meiotic map improves resolution of ancient vertebrate genome duplications. *Genome Research*. Jun 5, 2015. doi: 10.1101/gr.184135.114

## Articles – in press

Smith J.J., Timoshevskaya V.T., **Keinath M.C.**, Hardy D., Voss S.R. A Chromosome-Scale Assembly of the Enormous (32Gb) Axolotl Genome. In press at *Genome Research*  
<https://www.biorxiv.org/content/early/2018/07/20/373548>

## FELLOWSHIPS & AWARDS

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2017	UK Woman's Club Fellowship (\$2000)
2016	Teaching Assistantship: Introduction to Biology Laboratory (BIO155)
2016	Cold Spring Harbor Laboratory Registration Award (\$200) – for Biology of Genomes Meeting
2016 (spring)	Research Assistantship
2015	CSHL travel and tuition Grant (\$750) – for Computational and Comparative Genomics Course
2015	Dissertation Enhancement Award (\$3000) – for Computation and Comparative Genomics Course
2015 (fall)	Teaching Assistantship: Genetics Laboratory (BIO304) & Bioinformatics (BIO520)
2015	American Genetics Association travel fellowship – AGA2015, Chromosome Evolution: Molecular Mechanisms and Evolutionary Consequences.
2015	Meeting Fellowship award (\$750) – for registration to attend Genome 10K meeting
2015	Ribble travel grant (\$500) and graduate student travel award (\$325) – for travel to Plant and Animal Genome Conference
2014	Ribble travel grant (\$500) and graduate student travel award (\$400) – for travel to Plant and Animal Genome Conference
2013	Okinawa Institute of Science and Technology travel grant – for travel, housing, course fees for Okinawa Winter Education Course
2013	Ribble travel grant (\$500) and graduate student travel award (\$400) – for travel to Plant and Animal Genome Conference
2013- 2015	Research Assistantship –Randal Voss, DOD
2012 (fall)	Teaching Assistantship: Bioinformatics

## COURSES

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2015	CSHL: <i>Computational and Comparative Genomics</i> ; Cold Spring Harbor Laboratories. Cold Spring Harbor, NY.
2013	OWECS: <i>Okinawa Winter Course: Evolution of Complex Systems</i> ; Okinawa Institute of Science and Technology. Okinawa, Japan.

## ORAL PRESENTATIONS

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2018	Research Talk: <b>Fluorescent <i>in situ</i> hybridization on the loops of Lampbrush Chromosomes.</b> Carnegie Institute for Science; Baltimore, MD.
2017	Research Talk: <b>Identification of Sex-Specific Regions of Homomorphic Sex Chromosomes in a Large Vertebrate Genome.</b> Systems Biology & Omics Integration Journal Club; Lexington, KY.
2017	Research Talk: <b>Characterization of Homomorphic Sex Chromosomes in the Axolotl.</b> Graduate Student Research Talks; Lexington, KY.
2016	Host and Research Talk: <b>Computational Approaches to Characterizing Homomorphic Sex Chromosomes of the Axolotl.</b> First Annual Biology Ph.D. Candidate Symposium; Lexington, KY.

- 2016 Invited High School Speaker: 1) **Vertebrate Genome Evolution**. 2) **Sex Chromosome Evolution**. 3) **Sequencing and Assembling Genomes**. Multiple courses. Eminence High School. Eminence, KY.
- 2016 Research Talk: **Amphibians Provide Important Perspective for Vertebrate Genome Evolution**. Graduate Student Research Talks; Lexington, KY.
- 2016 Research Talk: **Computational Identification of Sex-Specific Regions Using Coverage Analyses**. Systems Biology & Omics Integration Journal Club; Lexington, KY.
- 2015 Research Talk: **Structure and Evolution of a Large Vertebrate Genome**. Graduate Student Research Talks; Lexington, KY.
- 2015 Research Talk: **Generation of Newt Linkage Map and Comparative Analyses**. Systems Biology & Omics Integration Journal Club; Lexington, KY.
- 2015 Invited High School Speaker: **The Salamander as a Model for Regeneration, Genome Variation and Sex chromosome evolution**. Vertebrate Evolution course. Lafayette High School. Lexington, KY.
- 2014 Research Talk: **Characterization of a Large Vertebrate Genome Using Shotgun and Laser Capture Chromosome Sequencing**. Graduate Student Research Talks; Lexington, KY.
- 2013 Small Meeting Talk: **New Methods in Genome Assembly of a Large Vertebrate Genome; Laser Capture Chromosome Sequencing and Assembly**. Regeneration Meeting; Lexington, KY.
- 2013 Research Talk: **Conserved Synteny of Lamprey Linkage Map Provides No Evidence for 2 Whole Genome Duplications**. Graduate Student Research Talks; Lexington, KY.

## INVITED TALKS

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- 2016 Conference Talk: **Sequencing Sex Chromosomes and Salamander Genomes**.  
Midwest  
Ecology and Evolution Conference; Oxford, OH.

## POSTER PRESENTATIONS

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- 2017 Keinath, M. C., Voss, S. R., Timoshevskaya N.Y., Smith, J. J. *Characterization of a pair of homologous salamander sex chromosomes*. UT KBRIN Summit. Montgomery Bell State Park, TN.
- 2016 Keinath, M. C., Voss, S. R., Smith, J. J. *Characterization of a large vertebrate genome and sex chromosomes using shotgun and laser capture chromosome sequencing*. Biology of Genomes Meeting. Cold Spring Harbor, NY.
- 2015 Keinath, M. C., Voss, S. R., Smith, J. J. *Initial characterization of a large vertebrate genome and sex chromosomes*. Computational and Comparative Genomics Course. Cold Spring Harbor, NY.
- 2015 Keinath, M. C., Voss, S. R., Smith, J. J. *Characterization of a large vertebrate genome using shotgun and laser capture chromosome sequencing*. Chromosome Evolution Meeting. Bainbridge Island, Washington.
- 2015 Keinath, M. C., Voss, S. R., Smith, J. J. *Characterization of a large vertebrate genome using shotgun and laser capture chromosome sequencing*. Genome 10K Meeting. Santa Cruz, California.
- 2015 Keinath, M. C., Voss, S. R., Smith, J. J. *Characterization of a large vertebrate genome using shotgun and laser capture chromosome sequencing*. Plant and Animal Genome Conference. San Diego, California.

- 2014 Keinath, M. C., Smith, J. J., Voss, S. R. *Enabling the endangered Mexican axolotl for biomedical research*. Plant and Animal Genome Conference. San Diego, California.
- 2014 Keinath, M. C., Voss, S. R., Smith, J. J. *Laser capture microdissection and whole chromosome amplification for sequencing large genomes*. Plant and Animal Genome Conference. San Diego, California.
- 2013 Keinath, M. C. and Smith, J. J. *Construction of a comprehensive linkage map in the sea lamprey, *Petromyzon marinus**. Plant and Animal Genome Conference, San Diego, California.

## **TEACHING**

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2018	Practical Genomics (course developer; TA), Johns Hopkins
2016 (fall)	Bioinformatics (TA; substitute lecturer), Kentucky
2015 (fall)	Bioinformatics (TA; substitute lecturer), Kentucky
2015 (fall)	Laboratory for Genetics (TA), Kentucky
2014 (fall)	Bioinformatics (TA; substitute lecturer), Kentucky
2012 (fall)	Laboratory for Biology I (TA), Kentucky

## **MENTORING**

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### **Undergraduate Students**

Isabel Ryan (2018). CTCF and cohesin in axolotl lampbrush chromosomes.

Drew Hardy (2017-2018). Validation of Z- and W-linked scaffolds in the axolotl.

Zach Fortenbery (2014- 2017). Understanding programmed genome rearrangement in lamprey.

William Bradley Osborne (2015- 2017). The role of p53 in lamprey genome.

Kalen Wright (2014- 2016). Evolution of myelin-associated proteins in vertebrates.

Aum Patel (2015- 2016). Characterizing sex determination in the axolotl.

Sarah Whelan (2013-2015). Characterization of germline development in lamprey.

Patrick Osterhaus (2014- 2015). Resolving the newt linkage map using laser-captured chromosomes and synteny studies.

### **Graduate Students**

Tabea Moll (2018). Centromeres, CTCF, and synapomorphic complexes in axolotl and *X. tropicalis* lampbrush chromosomes.

Courtney Waterbury (2016-2017). Comparative genomics of basal vertebrates.

Cody Saraceno (2015-2017). Understanding oncogenes from somatic lamprey programmed genome rearrangement.

## **SERVICE & VOLUNTEER**

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### **University and Department Committees**

Department of Embryology Postdoctoral Fellow Association (2018-present)

Biology Graduate Student Association Vice President (2016)

Biology Graduate Student Association Member (2012 – 2017)

### **Outreach**

C-MOOR R assignment content creator (2018)

BioEYES volunteer at US Science and Engineering Festival in DC (2018)

Biobonanza: Genomics for local high school students (2016)

Academic Majors Fair: Biology & Neuroscience (2015)

Genetics and Bioinformatics tutoring (2014-2017)

Member of graduate school Q&A panel for undergraduate and REU students (2013 – 2017)

High School calculus and chemistry tutoring (2010 – 2013)

Science education twice annually at James Lane Allen Elementary School (2011 – 2017)

Science Fair Judge annually at Ashland Elementary School (2012 – 2017)

Science Fair Judge annually at James Lane Allen Elementary School (2012 – 2017)