

Curriculum Vitae
David E. Hufnagel
912 1st Street
Nevada, IA 50201
Cell: (517) 416-0097
davidehuf@gmail.com

EDUCATION:

Iowa State University, Ames, IA

August 2013 to December 2019

- Was enrolled in the Bioinformatics and Computational Biology PhD program working at the department of Ecology, Evolution, and Organismal Biology.
- GPA: 3.62/4.00

Michigan State University, East Lansing, MI

August 2008 to December 2012

- Bachelor of Science in Genomics and Molecular Genetics under Lyman Briggs College
 - Honors College
 - Graduated with honors
 - GPA: 3.74/4.00
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SELECTED WORK EXPERIENCE:

PhD Candidate

April 2014 to December 2019

Dr. Matthew Hufford; Ecology, Evolution, and Organismal Biology Department, Ames, IA

- Used GBS SNP data of a broad sampling of hybrid teosinte to more deeply explore the origins, evolution, and genomic architectures of hybridization in hybrid teosinte populations in Mexico.
- Built a command-line tool, SequelTools, which works on any operating system to provide a variety of functionalities that assist researchers in working with PacBio Sequel raw sequence data including quality control, unbiased data reduction, and data normalization (Pub. 8 below)
- Contributed to a project producing *de novo* PacBio genome assemblies for 25 founders of the maize Nested Association Mapping (NAM) population as well as the next version of the maize B73 reference genome. My responsibilities included quality control via read mapping, SNP calling, and phylogenetics.
- Completed a project exploring admixture among teosinte in putative hybrid zones, presenting these hybrids and their parental taxa as a model system for studying hybridization. (Pub. 7 below)
- Mentored an undergraduate assistant for two years. This experience improved my organizational and leadership skills in the context of advancing mutual research goals.
- Contributed to a project using ancient DNA samples to determine the ancestry of maize from the US Southwest, the timing of diffusion into the US, and local adaptation loci. (Pub. 4 below)

Undergraduate Research Assistant / Programmer

June 2011 to July 2013

Dr. Shin-Han Shiu, Plant Biology Department, Michigan State University, East Lansing, MI

- Worked as project leader examining the characteristics of pseudogenes across 32 species of land plants.
- Contributed to the creation of the gene annotation tool MAKER-P. (Pub. 2 Below)
- With colleagues, used our newly assembled *Raphanus raphanistrum* genome along with available genomes (*Arabidopsis thaliana*, *A. lyrata* and *Brassica rapa*) to answer three major questions (Pub. 3 below):
 - How has the evolution of genome structure in the Brassicaceae family been affected by whole genome duplication?
 - Are duplicate genes likely to pseudogenize immediately following duplication?
 - What functional gene categories are enriched among species that have undergone recent whole genome duplication?

Undergraduate Research Assistant

January 2009 to August 2011

Dr. Cornelius Barry, Horticulture Department, Michigan State University, East Lansing, MI

- Mapped the easy peel (ep) locus to the molecular map of tomato revealing linkage to chromosome 8. The *ep* locus alters the general adhesion of the skin to the fruit.

- Worked with Dr. Barry under the Plant Genomics at MSU Summer Internship with research in two areas: 1) The cloning and the sequencing of genes involved in terpene biosynthesis in *Solanum* species. (Pub. 1 below) 2) The cloning and sequencing of a candidate gene involved in fruit quality of tomato using several heirloom varieties.
- Gained proficiency in general lab procedures including the preparation of solutions, PCR, gel electrophoresis, DNA purification, DNA and RNA extraction and purification, RT-PCR, DNA cloning and DNA sequencing.

SELECTED PRESENTATIONS AND POSTERS:

Maize Genetics Conference **March 2015, March 2017, March 2019**

- Presented posters on teosinte hybridization and hybrid zones in Mexico.

Panzea Talks **March 2015, November 2017**

- Delivered oral presentations on teosinte hybrids and hybrid zones and received feedback from some of the biggest names in maize research for this video conference.

International Evolution Conference **June 2015**

- Gave an oral presentation on teosinte hybrids and hybrid zones at this conference in Brazil.

BCB690 Student Seminar Presentation **February 2014**

- Presented on the effect of historical introgression on the diversity and demography of maize for which I was awarded a \$1,200 travel grant for the best presentation.

SELECTED CAREER BUILDING EXPERIENCES:

Teaching Assistantship for BCBI0 444 **Fall 2017**

- Responsibilities included creating and delivering both labs and lectures, grading, and holding office hours. This course, Bioinformatic Analysis, was an advanced elective in bioinformatics using a hands-on approach to learning.

BCB Graduate Student Organization **May 2014 to April 2015, May 2016 to May 2017**

- Served in 2014/2015 on the Bioinformatics and Computational Biology Graduate Student Organization (BCBGSO) executive committee as the Director of Outreach and in 2016/2017 as the Director of Social Activities.
- In 2016/2017, I brought together all interested BCB students at ISU by hosting social events intended to maintain a friendly, consistent and well-connected community. I also assisted in other projects.
- In 2014/2015 and 2016/2017 I assisted in organizing the first and third annual BCB Symposia. The symposia featured keynote speakers, lightning talks, and poster sessions on the topic of Bioinformatics. These graduate-student-organized events taught me that with many people and steadfast determination even very large organizational tasks are possible.
- In 2014/2015 led the advertising, planning, execution and re-evaluation of five UNIX and Python Workshops. Attendance ranged from around 35 people to 70 per workshop.

Teaching Assistantship for BIOL 211L **Fall 2014, Fall 2015, Fall 2016, Fall 2018**

- Responsibilities included delivering all lectures, grading, holding office hours and guiding students through lab exercises for two three-hour sections of Principles of Biology Lab I.

Teaching Assistantship for BIOL 212L **Spring 2019**

- Responsibilities included delivering all lectures, grading, holding office hours and guiding students through lab exercises for two three-hour sections of Principles of Biology Lab II.

COMPUTATIONAL PROFICIENCIES (In order of decreasing expertise):

- Python: Took one course dedicated to Python, and two partially dedicated to the subject. Additionally, I have used Python regularly in my work in various labs.
- UNIX: Used UNIX regularly in my work in various labs.
- R: Used R regularly in my work in various labs.
- Bash: Learned Bash by building the program SequelQC (pub. 8 below)
- C++: Took two courses at MSU dedicated to C++ and software design.
- Java: Self-taught with fundamental skills. Used the language for BCB568 at ISU.
- awk: Self-taught with basic skills.

PUBLICATIONS:

9. Ou S, Liu J, Chougule K, Fungtammasan A, Seetharam A, Stein J, Llaca V, Manchanda N, Wei X, Chin C, **Hufnagel DE**, Pedersen S, Snodgrass S, Fengler K, Woodhouse M, Hannigan B, Dawe RK, Hirsch CN, Hufford MB, and Doreen Ware. **Effect of Sequence Depth and Length in Long-read Assembly of the Maize Inbred NC350**. Submitting to *Nature Communications* (in revision)
8. **Hufnagel DE***, Hufford MB, and Arun S. Seetharam*. **SequelTools: A Suite of Tools for Working with PacBio Sequel Raw Sequence Data**. Submitted to *BMC Bioinformatics*. (* co-corresponding authors) (in submission)
7. **Hufnagel DE**, Kananen K, Glaubitz JC, Sanchez-González J, Doebley JF, and Matthew B. Hufford. **Multiple Putative Teosinte Hybrid Zones Discovered in Central Mexico**. Submitting to *New Phytologist*. (in submission)
6. Wu G, **Hufnagel DE**, Denton AK and Shin-Han Shiu. (2015) **Retained duplicate genes in green alga *Chlamydomonas reinhardtii* tend to be stress responsive and experience frequent response gains**. *BMC Genomics*. doi:10.1186/s12864-015-1335-5.
5. Lehti-Shiu MD, Uygun S, Moghe GD, Panchy N, Fang L, **Hufnagel DE**, Jasicki HL, Feig M and Shin-Han Shiu. (2014) **Molecular evidence for functional divergence and decay of a transcription factor derived from whole genome duplication in *Arabidopsis thaliana***. doi: <http://dx.doi.org/10.1104/pp.15.00689>
4. Da Fonseca RR, Smith BD, Wales N, Cappellini E, Pontus S, Fumagalli M, Samaniego JA, Caroe C, Avila-Arcos MC, **Hufnagel DE**, Korneliussen TS, Vieira FG, Jakobsson M, Arriaza B, Willerslev E, Nielson R, Hufford MB, Albrechtsen A, Ross-Ibarra J and M Thomas P. Gilbert. (2015) **The origin and evolution of maize in the Southwest United States**. *Nature Plants*.
3. Moghe G, **Hufnagel DE**, Tang H, Xiao Y, Dworkin I, Town CD, Conner JK, and Shin-Han Shiu. (2014) **Consequences of whole-genome triplication as revealed by comparative genomic analyses of the wild radish *Raphanus raphanistrum* and three other Brassicaceae species**. *The Plant Cell*. 26(5):1925-1937.
2. Campbell MS, Law M, Holt C, Stein JC, Moghe GD, **Hufnagel DE**, Lei J, Achawanantakun R, Jiao D, Lawrence CJ, Ware D, Shiu SH, Childs KL, Sun Y, Jiang N, and Mark Yandell. (2014) **MAKER-P: a Tool-kit for the rapid creation, management, and quality control of plant genome annotations**. *Plant Physiology*. 164(2):513-24. doi: 10.1104/pp.113.230144.
1. Gonzales-Vigil E, **Hufnagel DE**, Kim J, Last RL, and Cornelius S. Barry (2012) **Evolution of TPS20-related terpene synthases influences chemical diversity in the glandular trichomes of the wild tomato relative *Solanum habrochaites***. *The Plant Journal*. DOI: 10.1111/j.1365-313X.2012.05040.x

HONORS AND AWARDS:

Plant Sciences Institute Fellowship	Fall 2013-Spring 2017
ISU BCB Graduate Student Organization Leadership and Service Award	Spring 2015
Bioinformatics and Computational Biology Travel Award	Spring 2014
Brown Fellowship	Fall 2013
Honor's Society	Fall 2013
Gilmore Award	Fall 2012
Steven T. and Esther M. Spees Scholarship	Fall 2011
Dr. Ronald C. Hamelink Scholarship	Spring 2011
Pamela Ann Merry Scholarship	Fall 2010
2010 Plant Genomics at MSU Summer Internship	Summer 2010
Lyman Briggs College Undergraduate Research Support Program	Fall 2009
Michigan Competitive Scholarship	Fall 2008-Spring 2012
Dean's List	Fall 2008, Spring 2009, Fall 2010- Fall 2011

REFERENCES:

- Dr. Matthew Hufford. 339A Bessey Hall. Ames, IA. 50011.
(515) 294-8511. mhufford@iastate.edu
- Dr. Karin Dorman. 2411 Snedecor Hall. Ames, IA. 50011.
(515) 294-1457. kdorman@iastate.edu
- Dr. Arun Seetharam. 448 Bessey Hall. Ames, IA. 50011
(515) 294-6407. arnstrm@iastate.edu