

## Daniel H. Chitwood, PhD (he/him)

Associate Professor | Michigan State University

70% Dept. Horticulture | 30% Dept. Comp. Math. Sci. & Eng.  
85% Research | 15% Teaching

email | dhchitwood@gmail.com

ORCID | <https://orcid.org/0000-0003-4875-1447>

LinkedIn | [linkedin.com/in/dan-chitwood-b06988277](https://www.linkedin.com/in/dan-chitwood-b06988277)

ScholarGPS | <https://scholargps.com/scholars/10876533249393/daniel-h-chitwood>

Google Scholar | <https://scholar.google.com/citations?user=RVFQ6rQAAAAJ&hl=en>

6,772 citations, 41 h-index, 68 i10-index

Last update: 9 December 2024



### Mission and Values

To apply algorithmic thinking to scientific practice, and likewise, to use my experience in plant biology creatively and with purpose within computational settings. As a trained plant biologist, I learn about computational approaches through teaching. My most valued experiences arise from working between groups, whether across disciplines, cultures, countries, or languages. I value equity and reciprocity in working relationships with individuals and institutions. Science and technology only benefit humanity to the degree that they are inclusively practiced and equitably distributed.

### Education and Career

<i>1 Jul 24 - present</i>	<b>Associate Professor</b>   Michigan State University
<i>1 Jan 18 - 30 Jun 24</i>	<b>Assistant Professor</b>   Michigan State University
<i>1 Mar 17 - 31 Dec 17</i>	<b>Independent Researcher</b>   Santa Rosa, CA
<i>2014 - 28 Feb 17</i>	<b>Adjunct faculty</b>   Washington University in St. Louis, Dept. of Biology
<i>2013 - 28 Feb 17</i>	<b>Adjunct faculty</b>   University of Missouri, St. Louis, Dept. of Biology
<i>2013 - 28 Feb 17</i>	<b>Assistant Member</b>   Donald Danforth Plant Science Center
<i>2009 - 2013</i>	<b>Post-doc</b>   U.C. Davis, Lab of Dr. Neelima Sinha
<i>2004 - 11 Mar 09</i>	<b>PhD student</b>   Cold Spring Harbor, Lab of Dr. Marja Timmermans
<i>2003 - 2004</i>	<b>Quality control microbiologist</b>   Ernest and Julio Gallo Winery
<i>1999 - 2003</i>	<b>Undergraduate student</b>   U.C. Davis. BS, Genetics. Highest Honors

### Honors and Awards

<i>2021-2024</i>	MSU College of Agriculture and Natural Resources Global Scholar
<i>2017</i>	Kaplan Memorial Lecture in Comparative Development, Botanical Society of America
<i>2015</i>	American Society of Plant Biologists (ASPB) Early Career Award
<i>2010-2013</i>	Life Sciences Research Fellowship, Gordon and Betty Moore Foundation Fellow
<i>2004-2009</i>	George A. and Marjorie H. Anderson Fellow (Cold Spring Harbor Laboratory)
<i>2004-2007</i>	National Science Foundation Graduate Research Fellow
<i>1999-2003</i>	University of California Regents' Scholar
<i>1999-2003</i>	Ernest and Julio Gallo Winery Scholarship and Intern Fellow

### Publications and Proceedings (peer-reviewed)

I have published 96 peer-reviewed articles and currently have 4 pre-prints. While at MSU I have published 47 peer-reviewed articles of which 7 I am first author and 24 corresponding author. At MSU I have published 116x with students in classes that I teach, 40x with post-docs that I advise, 8x with graduate students, 4x with undergraduate researchers, and 1x with visiting scholars.

Post-docs<sup>p</sup>, graduate students<sup>g</sup>, and undergraduates<sup>u</sup> advised by and student authors<sup>s</sup> taught by me are indicated. Corresponding authors<sup>c</sup>, equal contributions\*, journal impact factors, and published class projects with student co-authors are indicated as well.

I have published peer-reviewed manuscripts on the following species: *Vitis* and *Ampelopsis* spp. (grapevines, x24); *Solanum* sect. *Lycopersicon* (tomato and wild relatives, x18); *Arabidopsis* (x7); broad comparative studies across plant species (x5); maize (x3); maracuyá (*Passiflora* spp., x3); *Caulerpa taxifolia* and other siphonous algae (x2); citrus (x2); *Alstroemeria psittacina* (Peruvian lily, x1); apple (x1); barley (x1); *Calathea* spp. (prayer plant, x1); *Capsella bursa-pastoris* (Shepherd's purse, x1); *Cannabis* (x1); cassava (x1); cherry (x1); coca (x1); *Coleus* spp. (x1); common bean (x1); cotton (x1); *Gevuina avellana* (Chilean hazelnut, x1); *Gilia* spp. (blue thimble flower, x1); walnut (x1); yeast (x1)

I have published peer-reviewed manuscripts on the following topics: leaf development (x47); morphometrics (x42); gene expression (x16); environmental plasticity, physiology, and climate (x14); topological data analysis (x12); small RNA biology (x11); genetics (x10); persistent homology (x8); rootstocks (x9); X-ray CT (x6); class projects involving student co-authors (x5); social justice, curriculum, and educational research (x5); mapper graphs (x4); auxin (x3); Euler characteristic transform (x2)

---

96. Migicovsky Z<sup>PC</sup>, Swift JF, Awale M, Helget Z, Klein LL, Pinkner L, Woodhouse K, Cousins P, Fennell AY, Miller A, Chitwood DH<sup>C</sup> (2024) **Terroir and rootstock effects on leaf shape in California Central Valley vineyards**. *Plants, People, Planet*.

- DOI: <https://doi.org/10.1002/ppp3.10620>
- Pre-print: <https://doi.org/10.1101/2024.04.02.587833>
- GitHub: [https://github.com/DanChitwood/terroir\\_and\\_rootstock](https://github.com/DanChitwood/terroir_and_rootstock)
- Impact factor: 5.1. 1x postdoc, 1x corresponding

95. Chitwood DH<sup>C</sup>, Delaye L, Domínguez-Castro C, Hernández-López A, López-Medellín X, Mojica-Muñoz DM, Rougon-Cardoso A (2024) **Si se puede: the enduring legacy of Mexico on wine and politics**. *Plants, People, Planet*. 1-10

- DOI: <https://doi.org/10.1002/ppp3.10597>
- Pre-print in English: <https://osf.io/preprints/socarxiv/372rj>
- Pre-print en español: <https://osf.io/8shkm>
- GitHub: [https://github.com/DanChitwood/vino\\_mexicano](https://github.com/DanChitwood/vino_mexicano)
- Impact factor: 5.1. 1x corresponding

94. Hightower AT, Chitwood DH, Josephs EB (2024) **Herbarium specimens reveal links between *Capsella bursa-pastoris* leaf shape and climate**. *American Journal of Botany*. e16435

- DOI: <https://doi.org/10.1002/ajb2.16435>
- Pre-print: <https://doi.org/10.1101/2024.02.13.580180>
- GitHub: [https://github.com/AsiaH1994/Capsella\\_Leaf\\_Shape\\_Herbarium\\_project](https://github.com/AsiaH1994/Capsella_Leaf_Shape_Herbarium_project)
- Impact factor: 2.4.

93. Chitwood DH<sup>\*C</sup>, Rougon-Cardoso A<sup>\*C</sup>, VanBuren R<sup>\*C</sup> (2024) **Interdisciplinarity through internationality: Results from a US-Mexico graduate course bridging computational and plant science**. *Plant Direct*. 8(10):e70019

- DOI: <https://doi.org/10.1002/pld3.70019>
- En español: <https://tinyurl.com/yc5wbkrr>
- Pre-print: <https://doi.org/10.1101/2024.06.19.599776>
- GitHub: [https://github.com/DanChitwood/interdisciplinary\\_international\\_education](https://github.com/DanChitwood/interdisciplinary_international_education)
- Impact factor: 2.3. 1x corresponding

92. Palande S<sup>P</sup>, Arsenault J<sup>S</sup>, Basurto-Lozada P<sup>S</sup>, Bleich A<sup>S</sup>, Brown BNI<sup>S</sup>, Buysse SF<sup>S</sup>, Connors NA<sup>S</sup>, Adhikari SD<sup>S</sup>, Dobson KC<sup>S</sup>, Guerra-Castillo FX<sup>S</sup>, Guerrero-Carrillo MF<sup>S</sup>, Harlow S<sup>S</sup>, Herrera-Orozco H<sup>S</sup>, Hightower AT<sup>S</sup>, Izquierdo P<sup>S</sup>, Jacobs M<sup>S</sup>, Johnson NA<sup>S</sup>, Leuenberger W<sup>S</sup>, Lopez-Hernandez A<sup>S</sup>, Luckie-Duque A<sup>S</sup>, Martínez-Avila C<sup>S</sup>, Mendoza-Galindo E<sup>S</sup>, Cruz Plancarte D<sup>S</sup>, Schuster JM<sup>S</sup>, Shomer H<sup>S</sup>, Sitar SC<sup>S</sup>, Steensma AK<sup>S</sup>, Thomson JE<sup>S</sup>, Villaseñor-Amador D<sup>S</sup>, Waterman R<sup>S</sup>, Webster BM<sup>S</sup>, Whyte M<sup>S</sup>, Zorilla-Azcué S<sup>S</sup>, Montgomery BL, Husbands AY, Krishnan A, Percival S<sup>P</sup>, Munch E, VanBuren R,

Chitwood DH<sup>C</sup>, Rougon-Cardoso A<sup>C</sup> (2024) **Expression-based machine learning models for predicting plant tissue identity.** *Applications in Plant Sciences*. e11621

- **Class project:** Fall 2021 HRT841: Foundation in computational and plant science | Posgrado UNAM Temas selectos: bioinformática y minería de datos con python
- DOI: <https://doi.org/10.1002/aps3.11621>
- Pre-print: <https://doi.org/10.1101/2023.08.20.554029>
- GitHub: <https://github.com/PlantsAndPython/arabidopsis-gene-expression>
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.4b8gthn7>
- Impact factor: 2.7. 32x student, 2x postdoc, 1x corresponding

91. Chitwood DH<sup>C</sup>, Torres-Lomas E, Hadi ES<sup>S</sup>, Peterson WLG<sup>S</sup>, Fischer MF<sup>S</sup>, Rogers SE<sup>S</sup>, He C<sup>S</sup>, Acierno MGF<sup>S</sup>, Azumaya S<sup>S</sup>, Benjamin SW<sup>S</sup>, Chalise DP<sup>S</sup>, Chess EE<sup>S</sup>, Engelsma AJ<sup>S</sup>, Fu Q<sup>S</sup>, Jaikham J<sup>S</sup>, Knight BM<sup>S</sup>, Kodjak NS<sup>S</sup>, Lengyel A<sup>S</sup>, Muñoz BL<sup>S</sup>, Patterson JT<sup>S</sup>, Rincon SI<sup>S</sup>, Schumann FL<sup>S</sup>, Shi Y<sup>S</sup>, Smith CC<sup>S</sup>, St. Clair MK<sup>S</sup>, Sweeney CS<sup>S</sup>, Whitaker P<sup>S</sup>, Wu J<sup>S</sup>, Diaz-Garcia L<sup>C</sup> (2024) **A high resolution model of the grapevine leaf morphospace predicts synthetic leaves.** *Plants, People, Planet*. 1-14

- **Class project:** Fall 2023 HRT812: Laboratory Research Techniques | UC Davis VEN101A: Viticultural Practices
- DOI: <https://doi.org/10.1002/ppp3.10561>
- Pre-print: <https://doi.org/10.1101/2024.03.08.584086>
- GitHub: [https://github.com/DanChitwood/synthetic\\_leaves](https://github.com/DanChitwood/synthetic_leaves)
- Impact factor: 5.98. 26x student, 1x first, 1x corresponding

90. Przelomska N, Diaz R, Andrés Ávila F, Ballen GA, Cortés-B R, Kistler L, Chitwood DH, Charitonidou M, Renner SS, Pérez-Escobar OA, Antonelli A (2024) **Morphometrics and phylogenomics of coca (*Erythroxylum spp.*) illuminate its reticulate evolution, with implications for taxonomy.** *Molecular Biology and Evolution*. 41(7):msae114

- DOI: <https://doi.org/10.1093/molbev/msae114>
- Pre-print: <https://doi.org/10.1101/2023.11.28.569066>
- Figshare: <https://doi.org/10.6084/m9.figshare.25709913>
- Impact factor: 11.0.
- El Espectador (español):

<https://www.elespectador.com/colombia-20/paz-y-memoria/plantas-de-coca-usadas-para-producir-cocaina-no-se-distinguen-de-coca-silvestres-codigo-genetico>

- Forbes:

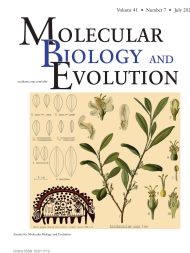
<https://www.forbes.com/sites/andrewwright/2024/08/01/unlocking-the-mysteries-of-the-plant-thats-raw-material-for-cocaine/>

89. Migicovsky Z<sup>C,P</sup>, Swift JF, Helget Z, Klein LL, Ly A, Maimaitiyiming M, Woodhouse K, Fennell A, Kwasniewski M, Miller AJ, Chitwood DH, Cousins P (2024) **Grapevine leaf size influences vine canopy temperature.** *OENO One*. 58:2

- DOI: <https://doi.org/10.20870/oeno-one.2024.58.2.7735>
- Pre-print: <https://doi.org/10.1101/2022.07.07.499216>
- GitHub: [https://github.com/zoemigicovsky/grape\\_leaf\\_temp](https://github.com/zoemigicovsky/grape_leaf_temp)
- Dryad: <https://doi.org/10.5061/dryad.3ffbg79m8>
- Impact factor: 3.0. 1x postdoc

88. DeTemple JM, Chitwood DH, Mosquera V, Whipple CJ (2024) **QTL analysis of divergent floral morphology traits between *Gilia yorkii* and *G. capitata*.** *G3 Genes|Genomes|Genetics*. jkae106

- DOI: <https://doi.org/10.1093/g3journal/jkae106>
- Pre-print: <https://doi.org/10.1101/2023.11.22.568340>
- GitHub: <https://github.com/detemplej/Gilia-QTL-data>
- Impact factor: 2.6.



87. Balant M<sup>VC</sup>, Garnatje T, Vitales D, Hidalgo O, Chitwood DH<sup>C</sup> (2024) **Intra-leaf modeling of *Cannabis* leaflet shape produces synthetic leaves that predict genetic and developmental identities.** *New Phytologist*. 243:781-796.  
 • DOI: <https://doi.org/10.1111/nph.19817>  
 • Pre-print: <https://doi.org/10.1101/2023.08.15.553356>  
 • GitHub: [https://github.com/BalantM/Cannabis\\_leaf\\_morpho](https://github.com/BalantM/Cannabis_leaf_morpho)  
 • Impact factor: 9.4. 1x visiting scholar, 1x corresponding
86. Ritter EJ, Cousins P, Quigley M<sup>P</sup>, Kile A, Kenchanmane Raju SK, Chitwood DH, Niederhuth C (2024) **From buds to shoots: Insights into grapevine development from the Witch's Broom bud sport.** *BMC Plant Biol*. 24:283  
 • DOI: <https://doi.org/10.1186/s12870-024-04992-y>  
 • Pre-print: <https://doi.org/10.1101/2023.09.25.559343>  
 • GitHub: <https://github.com/eleanore-ritter/witchs-broom/>  
 • Impact factor: 5.9. 1x postdoc
85. Amézquita EJ<sup>GC</sup>, Quigley MY<sup>P</sup>, Brown PJ, Munch E, Chitwood DH<sup>C</sup> (2024) **Allometry and volumes in a nutshell: Analyzing walnut morphology using three-dimensional X-ray computed tomography.** *The Plant Phenome Journal*. 7(1): e20095  
 • DOI: <https://doi.org/10.1002/ppj2.20095>  
 • Pre-print: <https://doi.org/10.1101/2023.09.26.559651>  
 • GitHub: [https://github.com/amezqui3/walnut\\_tda](https://github.com/amezqui3/walnut_tda)  
 • Dryad: <https://doi.org/10.5061/dryad.ngf1vhj09>  
 • Impact factor: 5.0. 1x grad, 1x postdoc, 1x corresponding
84. Percival S<sup>PC</sup>, Onyenedum JG, Chitwood DH<sup>C</sup>, Husbands AY<sup>C</sup> (2024) **Topological data analysis reveals a core heteroblastic program embedded in leaves of grapevine and maracuyá.** *PLOS Computational Biology*. 20(2):e1011845  
 • DOI: <https://doi.org/10.1371/journal.pcbi.1011845>  
 • Pre-print: <https://doi.org/10.1101/2023.07.14.549010>  
 • GitHub: <https://github.com/sperciva/maracuya-grapevine-TDA>  
 • Impact factor: 4.3. 1x postdoc, 1x corresponding
83. Palande S<sup>P\*</sup>, Kaste JAM<sup>S\*</sup>, Roberts MDS<sup>S\*</sup>, Segura Aba K<sup>S\*</sup>, Claucherty C<sup>S</sup>, Dacon J<sup>S</sup>, Doko R<sup>S</sup>, Jayakody TB<sup>S</sup>, Jeffrey HR<sup>S</sup>, Kelly N<sup>S</sup>, Manousidaki A<sup>S</sup>, Parks HM<sup>S</sup>, Roggenkamp EM<sup>S</sup>, Schumacher AM<sup>S</sup>, Yang J<sup>S</sup>, Percival S<sup>P</sup>, Pardo J<sup>S</sup>, Husbands AY, Krishnan A, Montgomery BL, Munch E, Thompson AM, Rougon-Cardoso A, Chitwood DH<sup>C</sup>, VanBuren R<sup>C</sup> (2023) **Topological data analysis reveals a core gene expression backbone that defines form and function across the flowering plants.** *PLOS Biology*. 21(12): e3002397  
 • **Class project:** Fall 2020 HRT841: Foundation in computational and plant science  
 • DOI: <https://doi.org/10.1371/journal.pbio.3002397>  
 • Pre-print: <https://doi.org/10.1101/2022.09.07.506951>  
 • GitHub: <https://github.com/PlantsAndPython/plant-evo-mapper>  
 • Zenodo: <https://zenodo.org/records/8428609>  
 • Impact factor: 9.8. 15x student, 2x postdoc, 1x corresponding

Associate Professor, Michigan State University, start date: 1 July 2024

---

82. Traband RC, Wang X, Lui J, Yu L, Hiraoka Y, Herniter IA, Bowman C, Resendiz M, Wang Z, Knowles SP, Lo S, Chitwood DH, Santiago L, Khan T, Seymour D, Roose ML, Chater JM, Jia Z<sup>C</sup> (2023) **Exploring the phylogenetic relationship among citrus through leaf shape traits: a morphological study on citrus leaves.** *Horticulturae*. 9(7):793  
 • DOI: <https://doi.org/10.3390/horticulturae9070793>  
 • Impact factor: 4.342

81. Marks RA<sup>C</sup>, Amézquita EJ<sup>G</sup>, Percival S<sup>P</sup>, Rougon-Cardoso A, Chibici-Revneanu C, Tebele SM, Farrant JM, Chitwood DH, VanBuren R (2023) **A critical analysis of plant science literature reveals ongoing inequities.** *Proc Natl Acad Sci USA*. 120(10):e2217564120

- DOI: <https://doi.org/10.1073/pnas.2217564120>
- Pre-print: <https://doi.org/10.1101/2022.10.15.512190>
- Dryad: <https://doi.org/10.5061/dryad.pg4f4qrb>
- Research highlight in *Nature Plants*: <https://doi.org/10.1038/s41477-023-01409-w>
- Impact factor: 10.700. 1x grad, 1x postdoc

80. Chitwood DH<sup>C</sup>, Mullins J<sup>U</sup> (2022) **A predicted developmental and evolutionary morphospace for grapevine leaves.** *Quantitative Plant Biology*. 3:e22

- DOI: <https://doi.org/10.1017/qpb.2022.13>
- Pre-print: <https://doi.org/10.1101/2022.01.29.478336>
- GitHub: [https://github.com/DanChitwood/leaves\\_that\\_are\\_or\\_were\\_not](https://github.com/DanChitwood/leaves_that_are_or_were_not)
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>
- Impact factor: none assigned, new journal. 1x undergrad, 1x first, 1x corresponding

79. Migicovsky Z<sup>P</sup>, Quigley MY<sup>P</sup>, Mullins J<sup>U</sup>, Ali T<sup>S</sup>, Swift JF, Agasaveeran AR<sup>S</sup>, Dougherty JD<sup>S</sup>, Grant BM<sup>S</sup>, Korkmaz I<sup>S</sup>, Malpeddi MR<sup>S</sup>, McNichol EL<sup>S</sup>, Sharp AW<sup>S</sup>, Harris JL, Hopkins DR, Jordan LM, Kwasniewski MT, Striegler RK, Downtin AL, Stotts S, Cousins P, Chitwood DH<sup>C</sup> (2022b) **X-ray imaging of 30 year old wine grape wood reveals cumulative impacts of rootstocks on scion secondary growth and Ravaz index.** *Horticulture Research*. uhac226

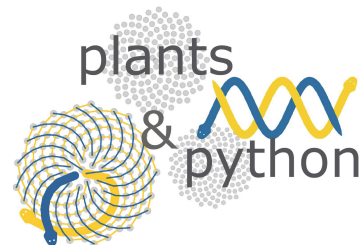
- **Class project:** Fall 2021 CMSE201: Introduction to computational modeling
- DOI: <https://doi.org/10.1093/hr/uhac226>
- Pre-print: <https://doi.org/10.1101/2022.05.17.492371>
- GitHub: [https://github.com/DanChitwood/grapevine\\_rings](https://github.com/DanChitwood/grapevine_rings)
- Dryad: <http://dx.doi.org/10.5061/dryad.gqnk98sqf>
- Impact factor: 7.291. 8x student, 1x undergrad, 2x postdoc, 1x corresponding

78. Amézquita EJ<sup>G</sup>, Quigley MY<sup>P</sup>, Ophelders T<sup>P</sup>, Seymour D, Munch E<sup>C</sup>, Chitwood DH<sup>C</sup> (2022) **The shape of aroma: measuring and modeling citrus oil gland distribution.** *Plants, People, Planet*. 1-14

- DOI: <https://doi.org/10.1002/ppp3.10333>
- Pre-print: <https://doi.org/10.1101/2022.04.14.488418>
- GitHub: [https://github.com/amezqui3/vitaminC\\_morphology](https://github.com/amezqui3/vitaminC_morphology)
- Dryad: <https://doi.org/10.5061/dryad.34tmpg4n6>
- Impact factor: 5.695. 1x grad, 2x postdoc, 1x corresponding

77. VanBuren R\*, Rougon-Cardoso A\*, Amézquita EJ<sup>G</sup>, Coss-Navarette EL<sup>S</sup>, Espinosa-Jaime A<sup>S</sup>, Gonzalez-Iturbe A<sup>S</sup>, Luckie-Duque AC<sup>S</sup>, Mendoza-Galindo E<sup>S</sup>, Pardo J, Rodríguez-Guerrero G, Rosiles-Loeza PY<sup>S</sup>, Vásquez-Cruz M<sup>S</sup>, Fernandez-Valverde SL, Hernández-Hernández T, Palande S<sup>P</sup>, Chitwood DH<sup>C</sup> (2022) **Plants & Python, a series of lessons in coding, plant biology, computation, and bioinformatics | una serie de lecciones de programación, biología vegetal, cómputo, y bioinformática.** *Plant Cell*. 34(7):e1

- DOI: <https://doi.org/10.1093/plcell/koac187>
- Jupyter Book: <https://plantsandpython.github.io/PlantsAndPython>
- Teaching Tools announcement: <https://plantae.org/new-teaching-tool-plants-and-python/>
- Impact factor: 12.085. 7x student, 1x grad, 1x postdoc, 1x corresponding



76. Migicovsky Z<sup>PC</sup>, Swift JF, Helget Z, Klein LL, Ly A, Maimaitiyiming M, Woodhouse K, Fennell A, Kwasniewski M, Miller AJ, Cousins P, Chitwood DH<sup>C</sup> (2022a) **Increases in vein length compensate for leaf area lost to lobing in grapevine.** *American Journal of Botany*. 109(7):1063-1073

- DOI: <https://doi.org/10.1002/ajb2.16033>

- Pre-print: <https://doi.org/10.1101/2022.03.15.484490>
- GitHub: [https://github.com/zoemigicovsky/grape\\_leaf\\_lobing](https://github.com/zoemigicovsky/grape_leaf_lobing)
- Dryad: <https://doi.org/10.5061/dryad.3ffbg79m8>
- Impact factor: 3.325. 1x postdoc, 1x corresponding

75. Amézquita E<sup>G</sup>, Quigley MY<sup>P</sup>, Ophelders T<sup>P</sup>, Landis JB, Koenig D, Munch E<sup>C</sup>, Chitwood DH<sup>C</sup> (2021)

**Measuring hidden phenotype: Quantifying the shape of barley seeds using the Euler Characteristic Transform.** *in silico Plants*. 4(1): diab033

- DOI: <https://doi.org/10.1093/insilicoplants/diab033>
- Pre-print: <https://doi.org/10.1101/2021.03.27.437348>
- GitHub: <https://github.com/amezqui3/demeter/>
- Dryad: <https://doi.org/10.5061/dryad.rxdwbrv93>
- BotanyOne (español): <https://botany.one/es/2022/01/midiendo-el-fenotipo-oculto-con-tecnicas-matematicas-novedosas/>
- Impact factor: 3.1. 1x grad, 2x postdoc, 1x corresponding

74. Harris ZN, Awale M, Bhakta N, Chitwood DH, Fennell A, Frawley E, Klein LL, Kovacs LG, Kwasniewski M, Londo JP, Ma Q, Migicovsky Z<sup>P</sup>, Swift JF, Miller AJ<sup>C</sup> (2021) **Multi-dimensional leaf phenotypes reflect root system genotype in grafted grapevine over the growing season.**

*GigaScience*. 10(12): giab087

- DOI: <https://doi.org/10.1093/gigascience/giab087>
- Pre-print: <https://doi.org/10.1101/2020.11.10.376947>
- GitHub: [https://github.com/PGRP1546869/mt\\_vernon\\_2017\\_leaf](https://github.com/PGRP1546869/mt_vernon_2017_leaf)
- GigaDatabase: <http://gigadb.org/dataset/100956>
- Impact factor: 7.658. 1x postdoc

73. Li M<sup>P</sup>, Coneva V<sup>C,P</sup>, Clark D, Chitwood DH, Frank M<sup>C,P</sup> (2021) **Quantitative dissection of color patterning in the foliar ornamental coleus.** *Plant Physiology*. 187(3): 1310-1324

- DOI: <https://doi.org/10.1093/plphys/kiab393>
- Pre-print: <https://doi.org/10.1101/2021.01.11.426252>
- GitHub: <https://github.com/maoli0923/ColourQuant>
- Impact factor: 8.005. 3x postdoc

72. Migicovsky Z<sup>P</sup>, Cousins P, Jordan LM, Myles S, Striegler RK, Verdegaal P, Chitwood DH<sup>C</sup> (2021) **Rootstock choice can dramatically affect grapevine growth.** *Plant Direct*. 5(5): e00324

- DOI: <https://doi.org/10.1002/pld3.324>
- Pre-print: <https://doi.org/10.1101/864850>
- GitHub: [https://github.com/zoemigicovsky/grapevine\\_rootstocks](https://github.com/zoemigicovsky/grapevine_rootstocks)
- Impact factor: 3.369. 1x postdoc, 1x corresponding

71. Durrington B, Chong F, Chitwood DH<sup>C</sup>, Twitter Calathea Poll Participants, iNaturalist Citizen Scientists (2021) **Directional phyllotactic bias in calatheas (*Goepertia*, Marantaceae): a citizen science approach.** *Quantitative Plant Biology*. 2, E6

- DOI: <https://doi.org/10.1017/qpb.2021.2>
- Pre-print: <https://doi.org/10.1101/2020.11.13.382317>
- Figshare: <https://doi.org/10.6084/m9.figshare.13513176.v1>
- Impact factor: none assigned, new journal. 1x corresponding

70. Chitwood DH<sup>C</sup>, Mullins J<sup>U</sup>, Migicovsky Z<sup>P</sup>, Frank M<sup>P</sup>, VanBuren R, Londo JP (2021) **Vein-to-blade ratio is an allometric indicator of climate-induced changes in grapevine leaf size and shape.** *American Journal of Botany*. 108(4): 571-579

- DOI: <https://doi.org/10.1002/ajb2.1639>
- Pre-print: <https://doi.org/10.1101/2020.05.20.106906>
- GitHub: [https://github.com/DanChitwood/grapevine\\_climate\\_allometry](https://github.com/DanChitwood/grapevine_climate_allometry)
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>
- Impact factor: 3.325. 1x undergrad, 2x postdoc, 1x first, 1x corresponding

69. Soltani A<sup>C</sup>, Walter KA, Wiersma AT, Santiago JP, Quigley M<sup>P</sup>, Chitwood D, Porch TG, Miklas P, McClean PE, Osorno JM, Lowry DB (2021) **The genetics and physiology of seed dormancy, a crucial trait in common bean domestication.** *BMC Plant Biology*. 21:58  
 • DOI: <https://doi.org/10.1186/s12870-021-02837-6>  
 • Impact factor: 5.260. 1x postdoc
68. Maimaitiyiming M, Maimaitijiang M, Sidike P, Sagan V, Migicovsky Z, Chitwood DH, Cousins P, Dokoozlian N, Miller AJ, Kwasniewski M (2020) **Modeling early indicators of grapevine physiology using hyperspectral imaging and partial least squares regression (PLSR).** *IEEE International Geoscience and Remote Sensing Symposium*. 1117-1120.  
 • DOI: <https://doi.org/10.1109/IGARSS39084.2020.9323679>
67. Bryson AE<sup>\*S</sup>, Wilson Brown M<sup>\*S</sup>, Mullins J<sup>\*U</sup>, Dong W<sup>\*S</sup>, Bahmani K<sup>S</sup>, Bornowski N<sup>S</sup>, Chiu C<sup>S</sup>, Engelgau P<sup>S</sup>, Gettings B<sup>S</sup>, Gomezcano F<sup>S</sup>, Gregory LM<sup>S</sup>, Haber AC<sup>S</sup>, Hoh D<sup>S</sup>, Jennings EE<sup>S</sup>, Ji Z<sup>S</sup>, Kaur P<sup>S</sup>, Kenchanmane Raju SK, Long Y<sup>S</sup>, Lotreck SG<sup>S</sup>, Mathieu DT<sup>S</sup>, Ranaweera T<sup>S</sup>, Ritter EJ<sup>S</sup>, Sadohara R<sup>S</sup>, Shrote RZ<sup>S</sup>, Smith KE<sup>S</sup>, Teresi SJ<sup>S</sup>, Venegas J<sup>S</sup>, Wang H<sup>S</sup>, Wilson ML<sup>S</sup>, Tarrant AR<sup>S</sup>, Frank MH<sup>P</sup>, Migicovsky Z<sup>P</sup>, Kumar J, VanBuren R, Londo JP, Chitwood DH<sup>C</sup> (2020) **Composite modeling of leaf shape across shoots discriminates *Vitis* species better than individual leaves.** *Applications in Plant Sciences*. 8(12): 11404  
 • **Class project:** Fall 2019 HRT841: Foundation in computational and plant science  
 • DOI: <https://doi.org/10.1002/aps3.11404>  
 • Pre-print: <https://doi.org/10.1101/2020.06.22.163899>  
 • GitHub: [https://github.com/DanChitwood/grapevine\\_shoots](https://github.com/DanChitwood/grapevine_shoots)  
 • Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>  
 • Impact factor: 2.511. 28x student, 1x undergrad, 2x postdoc, 1x corresponding
66. Chitwood DH<sup>C</sup> (2020) **The shapes of wine and table grape leaves: an ampelometric study inspired by the methods of Pierre Galet.** *Plants, People, Planet*. 00:1-16  
 • DOI: <https://doi.org/10.1002/ppp3.10157>  
 • Pre-print: <https://doi.org/10.1101/2020.05.08.085175>  
 • GitHub: [https://github.com/DanChitwood/grapevine\\_ampelometry](https://github.com/DanChitwood/grapevine_ampelometry)  
 • Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.g79cnp5mn>  
 • Impact factor: 5.695. 1x first, 1x corresponding
65. Amézquita EJ<sup>G</sup>, Quigley MY<sup>P</sup>, Ophelders T<sup>P</sup>, Munch E<sup>C</sup>, Chitwood DH<sup>C</sup> (2020) **The shape of things to come: Topological data analysis and biology, from molecules to organisms.** *Developmental Dynamics*. 1-18  
 • DOI: <https://doi.org/10.1002/dvdy.175>  
 • Featured cover article: <https://doi.org/10.1002/dvdy.216>  
 • Impact factor: 2.842. 1x grad, 2x postdoc, 1x corresponding
64. Baumgartner A<sup>C</sup>, Donahoo M, Chitwood DH, Peppe DJ (2020) **The influences of environmental change and development on leaf shape in *Vitis*.** *American Journal of Botany*. 107(4):1-13  
 • DOI: <https://doi.org/10.1002/ajb2.1460>  
 • Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>  
 • Impact factor: 3.325
63. Rowland SD, Zumstein K, Nakayama H, Cheng Z, Flores AM, Chitwood DH, Maloof JN, Sinha NR<sup>C</sup> (2020) **Leaf shape is a predictor of fruit quality and cultivar performance in tomato.** *New Phytol*. 226:851-865  
 • DOI: <https://doi.org/10.1111/nph.16403>  
 • Pre-print: <https://doi.org/10.1101/584466>  
 • Impact factor: 10.323
62. Smith SY, Chitwood DH<sup>C</sup> (2020) **Plant-environment interactions: A sweeping perspective.** *Int J Plant Sci*. 181(2)



- DOI: <https://doi.org/10.1086/707481>
  - Impact factor: 3.142. 1x corresponding
61. Demmings (Takacs) EM, Williams B, Lee CR, Burgos PB, Hwang CF, Reisch BI, Chitwood DH, Londo JP<sup>c</sup> (2019) **QTL analysis of leaf morphology indicates conserved shape loci in grapevine.** *Front Plant Sci.* 10:1373
- DOI: <https://doi.org/10.3389/fpls.2019.01373>
  - Impact factor: 6.627
60. Eithun M<sup>cG</sup>, Chitwood DH, Larson J, Lang G, Munch E (2019) **Isolating phyllotactic patterns embedded in the secondary growth of sweet cherry (*Prunus avium* L.) using magnetic resonance imaging.** *Plant Methods.* 15, 111
- DOI: <https://doi.org/10.1186/s13007-019-0496-7>
  - Pre-print: <https://arxiv.org/abs/1812.03321>
  - GitHub: <https://github.com/eithun/cherry-phyllotaxy>
  - Figshare:  
[https://figshare.com/articles/dataset/MRI\\_Scan\\_of\\_Sweet\\_Cherry\\_Prunus\\_avium\\_L\\_/7409843](https://figshare.com/articles/dataset/MRI_Scan_of_Sweet_Cherry_Prunus_avium_L_/7409843)
  - Impact factor: 5.827. 1x grad
59. Li M<sup>p</sup>, Klein LL, Duncan KE, Jiang N, Chitwood DH, Londo JP, Miller A, Topp C<sup>c</sup> (2019) **Characterizing grapevine (*Vitis* spp.) inflorescence architecture using X-ray imaging: implications for understanding cluster density.** *J Exp Botany.* 70(21):6261-6276
- DOI: <https://doi.org/10.1093/jxb/erz394>
  - Pre-print: <https://doi.org/10.1101/557819>
  - GitHub: <https://github.com/Topp-Roots-Lab/Grapevine-inflorescence-architecture>
  - Impact factor: 7.378. 1x postdoc
58. Migicovsky Z<sup>p</sup>, Harris ZN, Klein LL, Li M, McDermaid A, Chitwood DH, Fennell A, Kovacs LG, Kwasniewski M, Londo JP, Ma Q, Miller AJ<sup>c</sup> (2019) **Rootstock effects on scion phenotypes in a 'Chambourcin' experimental vineyard.** *Hort. Res.* 6, 64
- DOI: <https://doi.org/10.1038/s41438-019-0146-2>
  - Pre-print: <https://doi.org/10.1101/484212>
  - GitHub: [https://github.com/PGRP1546869/mt\\_vernon\\_2014\\_2016](https://github.com/PGRP1546869/mt_vernon_2014_2016)
  - Impact factor: 7.291. 1x postdoc
57. Chitwood DH, Eithun M<sup>cG</sup>, Munch E, Ophelders T<sup>p</sup> (2019) **Topological Mapper for 3D Volumetric Images.** In: Burgeth B., Kleefeld A., Naegel B., Passat N., Perret B. (eds) *Mathematical Morphology and Its Applications to Signal and Image Processing. ISMM 2019. Lecture Notes in Computer Science*, vol 11564. Springer, Cham.
- DOI: [https://doi.org/10.1007/978-3-030-20867-7\\_7](https://doi.org/10.1007/978-3-030-20867-7_7)
  - Impact factor: none. 1x grad, 1x postdoc, 1x first
56. Barbosa MAM, Chitwood DH, Azevedo AA, Araújo WL, Riberio DM, Peres LEP, Martins SCV, Zsögön A<sup>c</sup> (2018) **Bundle sheath extensions affect leaf phenotypic plasticity in response to irradiance.** *Plant, Cell & Environment.* 42, 5:1575-1589
- DOI: <https://doi.org/10.1111/pce.13495>
  - Pre-print: <https://doi.org/10.1101/208850>
  - Impact factor: 7.947
55. Haus MJ<sup>c</sup>, Li M<sup>p</sup>, Chitwood DH, Jacobs TW (2018) **Long-distance and trans-generational stomatal patterning by CO<sub>2</sub> across *Arabidopsis* organs.** *Front. Plant Sci.* 9:1714
- DOI: <https://doi.org/10.3389/fpls.2018.01714>
  - Impact factor: 6.627. 1x postdoc
54. Skopelitis D, Hill K, Klesen S, Marco C, von Born P, Chitwood DH, Timmermans M<sup>c</sup> (2018) **Gating of miRNA movement at defined cell-cell interfaces governs their impact as positional signals.** *Nat Comm.* 9:3107
- DOI: <https://doi.org/10.1038/s41467-018-05571-0>



- Impact factor: 17.694

53. Li M<sup>P</sup>, Frank M, Coneva V, Mio W, Chitwood DH<sup>C</sup>, Topp CN<sup>C</sup> (2018) **The persistent homology mathematical framework provides enhanced genotype-to-phenotype associations for plant morphology.** *Plant Physiol.* 177(4): 1382-1395

- DOI: <https://doi.org/10.1104/pp.18.00104>
- Pre-print: <http://doi.org/10.1101/104141>
- GitHub: <https://github.com/maoli0923/Persistent-Homology-Tomato-Leaf-Root>
- Impact factor: 8.005. 1x postdoc, 1x corresponding

52. Li M<sup>P</sup>, An H, Angelovici R, Bagaza C, Batushansky A, Clark L, Coneva V<sup>P</sup>, Donoghue M, Edwards E, Fajardo D, Fang H, Frank M<sup>P</sup>, Gallaher T, Gebken S, Hill T, Jansky S, Kaur B, Klahs P, Klein L, Kuraparthy V, Londo J, Migicovsky Z<sup>P</sup>, Miller A, Mohn R, Myles S, Otoni W, Pires JC, Riffer E, Schmerler S, Spriggs E, Topp C, Van Deynze A, Zhang K, Zhu L, Zink BM, Chitwood DH<sup>C</sup> (2018) **Topological Data Analysis as a Morphometric Method: Using Persistent Homology to Demarcate a Leaf Morphospace.** *Front Plant Sci.* 9:553

- DOI: <https://doi.org/10.3389/fpls.2018.00553>
- Pre-print: <https://doi.org/10.1101/151712>
- GitHub: <https://github.com/maoli0923/Persistent-Homology-All-Leaf>
- Figshare: <https://figshare.com/articles/dataset/LeafMorphospace/4985561/1>
- Featured in *Nature*: <https://doi.org/10.1038/nature.2017.22230>
- Impact factor: 6.627. 4x postdoc, 1x corresponding

51. Coneva V<sup>C,P</sup>, Chitwood DH (2018) **Genetic and Developmental Basis for Increased Leaf Thickness in the Arabidopsis Cvi Ecotype.** *Front Plant Sci.* 9:322

- DOI: <https://doi.org/10.3389/fpls.2018.00322>
- Impact factor: 6.627. 1x postdoc

50. Migicovsky Z<sup>C,P</sup>, Li M, Chitwood DH, Myles S (2018) **Morphometrics reveals complex and heritable apple leaf shapes.** *Front Plant Sci.* 8:2185

- DOI: <https://doi.org/10.3389/fpls.2017.02185>
- Pre-print: <http://doi.org/10.1101/139303>
- Impact factor: 6.627. 1x postdoc

Assistant Professor, Michigan State University, start date: 1 January 2018

49. Chitwood DH, Otoni WC (2017b) **Divergent heteroblastic trajectories underlie disparate leaf shapes among Passiflora species.** *Plant Direct.* 1(5):e00028

- DOI: <https://doi.org/10.1002/pld3.28>
- Pre-print: <http://doi.org/10.1101/067520>
- GitHub: <https://github.com/DanChitwood/PassifloraLeaves>
- GigaDatabase: <http://gigadb.org/dataset/100251>

48. Coneva V, Frank MH, de Luis Balaguer MA, Li M, Sozzani R, Chitwood DH (2017) **Genetic architecture and molecular networks underlying leaf thickness in desert-adapted tomato *Solanum pennellii*.** *Plant Physiol.* 175(1):376-391

- DOI: <https://doi.org/10.1104/pp.17.00790>
- Pre-print: <http://doi.org/10.1101/111005>
- Featured in *National Geographic*:  
<https://www.nationalgeographic.com/foodfeatures/green-revolution/>

47. Bender, ALD, Chitwood DH, Bradley, AS (2017) **Heritability of the structures and <sup>13</sup>C fractionation in tomato leaf wax alkanes: a genetic model system to inform paleoenvironmental reconstructions.** *Front Earth Sci.* 5:47

- DOI: <https://doi.org/10.3389/feart.2017.00047>
- Pre-print: <http://doi.org/10.1101/110718>

- GitHub: <https://github.com/aldbender/13C-heritability>
46. Bucksch A, Atta-Boateng A, Azihou AF, Battogtokh D, Baumgartner A, Binder BM, Braybrook SA, Chang C, Coneva V, DeWitt TJ, Fletcher AG, Gehan MA, Diaz-Martinez DH, Hong L, Iyer-Pascuzzi AS, Klein LL, Leiboff S, Li M, Lynch JP, Maizel A, Maloof JN, Markelz RJC, Martinez CC, Miller LA, Mio W, Palubicki W, Poorter H, Pradal C, Price CA, Puttonen E, Reese J, Rellán-Álvarez R, Spalding EP, Sparks EE, Topp CN, Williams J, Chitwood DH (2017) **Morphological plant modeling: Unleashing geometric and topological potential within the plant sciences.** *Front Plant Sci.* 8:900
- DOI: <https://doi.org/10.3389/fpls.2017.00900>
  - Pre-print: <http://doi.org/10.1101/078832>
45. Li M, Duncan K, Topp CN, Chitwood DH (2017) **Persistent homology and the branching topologies of plants.** *Am J Bot.* 104(3):349-353
- DOI: <http://doi.org/10.3732/ajb.1700046>
44. Klein LL, Caito M, Chapnick C, Kitchen C, O'Hanlon R, Chitwood DH, Miller A (2017) **Digital morphometrics of two North American grapevines (Vitis: Vitaceae) quantifies leaf variation between species, within species, and among individuals.** *Front Plant Sci.* 8:373
- DOI: <http://doi.org/10.3389/fpls.2017.00373>
  - GitHub: <https://github.com/llklein/VitisDigitalMorphometricAnalysis>
  - Harvard Dataverse: <https://dataverse.harvard.edu/dataverse/VitisLeafVariation>
43. Chitwood DH, Otoni WC (2017a) **Morphometric analysis of Passiflora leaves: the relationship between landmarks of the vasculature and elliptical Fourier descriptors of the blade.** *GigaScience.* 6(1):1-13
- DOI: <http://doi.org/10.1093/gigascience/giw008>
  - Pre-print: <http://doi.org/10.1101/067512>
  - GitHub: <https://github.com/DanChitwood/PassifloraLeaves>
  - GigaDatabase: <http://gigadb.org/dataset/100251>
42. Wilson MC, Mutka AM, Hummel AW, Berry J, Chauhan RD, Vijayaraghavan A, Taylor NJ, Voytas DF, Chitwood DH, Bart RS (2017) **Gene expression analysis provides insight into the physiology of the important staple food crop cassava.** *New Phytologist.* 213(4):1632-1641
- DOI: <http://doi.org/10.1111/nph.14443>
  - Pre-print: <http://doi.org/10.1101/073213>
41. Andres RJ, Coneva V, Frank M, Tuttle JR, Samayoa LF, Han SW, Kaur B, Zhu L, Fang H, Bowman DT, Rojas-Pierce M, Haigler CH, Jones DC, Holland JB, Chitwood DH, Kuraparthi V (2017) **Modifications to a LATE MERISTEM IDENTITY-1 gene are responsible for the major leaf shapes of Upland cotton (Gossypium hirsutum L.).** *Proc Natl Acad Sci USA.* 114(1):E57-E66
- DOI: <http://doi.org/10.1073/pnas.1613593114>
  - Pre-print: <http://doi.org/10.1101/062612>
  - Mosaic poster: [https://figshare.com/articles/figure/Gossypium\\_hirsutum\\_mosaic/1509932](https://figshare.com/articles/figure/Gossypium_hirsutum_mosaic/1509932)

Independent Researcher, start date: 1 March 2017

---

40. Martinez CC, Chitwood DH, Smith RS, Sinha NR (2016) **Left-right leaf asymmetry in decussate and distichous phyllotactic systems.** *Philos Trans R Soc Lond B Biol Sci.* 371:20150412
- DOI: <http://doi.org/10.1098/rstb.2015.0412>
  - Pre-print: <http://doi.org/10.1101/043869>
  - Harvard Dataverse (tomato): <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/Y1E4S3>
  - Harvard Dataverse (grapevine): [https://dataverse.harvard.edu/dataverse/vitis\\_leaves](https://dataverse.harvard.edu/dataverse/vitis_leaves)
39. Chitwood DH, Irish VF (2016) **A renaissance in plant development.** *Dev Biol.* 419:4-6.
- DOI: <http://doi.org/10.1016/j.ydbio.2016.09.013>

38. Martinez CC, Koenig D, Chitwood DH, Sinha N (2016) **A sister of PIN1 gene in tomato (*Solanum lycopersicum*) defines organ initiation patterns by maintaining epidermal auxin flux.** *Dev Biol.* 419:85-98

- DOI: <http://doi.org/10.1016/j.ydbio.2016.08.011>
- Pre-print: <http://doi.org/10.1101/042150>
- GitHub: <https://github.com/iamciera/sister-of-pin1-material>

37. Fulop D, Ranjan A, Ofner I, Covington MF, Chitwood DH, West D, Ichihashi Y, Headland L, Zamir D, Maloof JN, Sinha NR (2016) **A new advanced backcross tomato population enables high resolution leaf QTL mapping and gene identification.** *G3.* 6:3169-3184

- DOI: <http://dx.doi.org/10.1534/g3.116.030536>
- Pre-print: <http://doi.org/10.1101/040923>
- GitHub: <http://github.com/mfcovington/bil-paper>

36. Ranjan A, Budke JM, Rowland SD, Chitwood DH, Kumar R, Carriedo L, Ichihashi Y, Zumstein K, Maloof JN, Sinha NR (2016) **eQTL regulating transcript levels associated with diverse biological processes in tomato.** *Plant Physiol.* 172:328-40

- DOI: <http://dx.doi.org/10.1104/pp.16.00289>
- Pre-print: <http://doi.org/10.1101/040592>

35. Frank MH, Chitwood DH (2016) **Plant chimeras: the good, the bad, and the Bizzaria.** *Dev Biol.* 419:41-53

- DOI: <http://doi.org/10.1016/j.ydbio.2016.07.003>
- Pre-print: <http://doi.org/10.1101/060715>

34. Chitwood DH, Sinha NR (2016) **Evolutionary and environmental forces sculpting leaf development.** *Curr Biol.* 26:R297-R306

- DOI: <http://doi.org/10.1016/j.cub.2016.02.033>

33. Fahlgren N, Bart R, Herrera-Estrella L, Rellán-Álvarez R, Chitwood DH, Dinneny JR (2016) **Plant scientists: GM technology is safe.** *Science.* 351:824

- DOI: <http://doi.org/10.1126/science.351.6275.824-a>

32. Chitwood DH, Rundell SM, Li DY, Woodford QL, Yu TT, Lopez JR, Greenblatt D, Kang J, Londo JP (2016) **Climate and developmental plasticity: interannual variability in grapevine leaf morphology.** *Plant Physiol.* 170:1480-91

- DOI: <http://doi.org/10.1104/pp.15.01825>
- Pre-print: <http://doi.org/10.1101/030957>
- Harvard Dataverse: [https://dataverse.harvard.edu/dataverse/vitis\\_leaves](https://dataverse.harvard.edu/dataverse/vitis_leaves)
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>

31. Warschefsky E, Klein L, Frank M, Chitwood DH, Londo JP, Bishop-von Wettberg EJ, Miller AJ (2016) **Rootstocks: diversity, domestication and impacts on shoot phenotypes.** *Trends in Plant Sci.* 21:418-37

- DOI: <http://doi.org/10.1016/j.tplants.2015.11.008>
- Featured cover article, May issue

30. Ostría-Gallardo E, Ranjan A, Zumstein K, Chitwood DH, Kumar R, Townsley B, Ichihashi Y, Corcuera LJ, Sinha NR (2016) **Transcriptomic analysis suggests a key role for *SQUAMOSA PROMOTER BINDING PROTEIN LIKE*, *NAC* and *YUCCA* genes in the heteroblastic development of the temperate rainforest tree *Gevuina avellana* Mol. (*Proteaceae*).** *New Phytol.* 210:694-708

- DOI: <http://doi.org/10.1111/nph.13776>

29. Chitwood DH, Klein LL, O'Hanlon R, Chacko S, Greg M, Kitchen C, Miller AJ, Londo JP (2016) **Latent developmental and evolutionary shapes embedded within the grapevine leaf.** *New Phytol.* 210:343-55

- DOI: <http://doi.org/10.1111/nph.13754>



- Pre-print: <http://doi.org/10.1101/018291>
- Harvard Dataverse: [https://dataverse.harvard.edu/dataverse/vitis\\_leaves](https://dataverse.harvard.edu/dataverse/vitis_leaves)
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061/dryad.zkh189377>

28. Chitwood DH, Kumar R, Ranjan A, Pelletier J, Townsley B, Ichihashi Y, Martinez CC, Zumstein K, Harada J, Maloof JN, Sinha NR (2015) **Light-induced indeterminacy alters shade avoiding tomato leaf morphology.** *Plant Physiol.* 169:2030-47

- DOI: <http://doi.org/10.1104/pp.15.01229>
- Pre-print: <http://doi.org/10.1101/024018>

27. Coneva V, Chitwood DH (2015) **Plant architecture without multicellularity: quandaries over patterning and the soma-germline divide in siphonous algae.** *Front Plant Sci.* 6:287

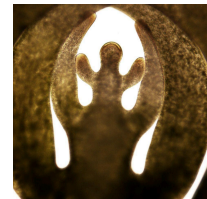
- DOI: <http://doi.org/10.3389/fpls.2015.00287>

26. Chitwood DH, Topp CN (2015) **Revealing plant cryptotypes: defining meaningful phenotypes among infinite traits.** *Curr Opin Plant Biol.* 24C:54-60

- DOI: <http://doi.org/10.1016/j.pbi.2015.01.009>

25. Ranjan A, Townsley BT, Ichihashi Y, Sinha NR, Chitwood DH (2015) **An intracellular transcriptomic atlas of the giant coenocyte *Caulerpa taxifolia*.** *PLoS Genet.* 11:e1004900

- DOI: <http://doi.org/10.1371/journal.pgen.1004900>
- Featured journal image, January issue:



<https://biologues.plos.org/2015/02/13/understanding-images-a-giant-single-celled-plant/>

24. Chitwood DH & Sinha NR (2014) **Plant Development: Small RNAs and the metamorphosis of leaves.** *Curr Biol.* 24:R1087-9

- DOI: <http://doi.org/10.1016/j.cub.2014.10.013>

23. Chitwood DH (2014) **Imitation, genetic lineages, and time influenced the morphological evolution of the violin.** *PLOS ONE.* 9:e109229

- DOI: <http://doi.org/10.1371/journal.pone.0109229>
- Mosaic poster: [https://figshare.com/articles/figure/Violin\\_mosaic/1194975](https://figshare.com/articles/figure/Violin_mosaic/1194975)
- Featured on *Science Friday*:

<https://www.sciencefriday.com/segments/how-did-the-violin-get-its-shape/>

- Featured in *The New York Times*:

<https://www.nytimes.com/2014/10/30/arts/international/how-stradivari-came-to-dictate-violin-design.html>

- Featured in *Los Angeles Times*:

<https://www.latimes.com/science/sciencenow/la-sci-sn-how-did-violins-get-their-shape-study-20141010-story.html>

- Featured in *El País*: [https://elpais.com/elpais/2014/10/08/ciencia/1412784114\\_852581.html](https://elpais.com/elpais/2014/10/08/ciencia/1412784114_852581.html)

- Featured in *Scientific American*:

<https://www.scientificamerican.com/article/plant-biology-informs-the-origins-of-the-stradivarius/>

22. Chitwood DH, Ranjan A, Kumar R, Ichihashi Y, Zumstein K, Headland LR, Ostria-Gallardo E, Aguilar-Martínez JA, Bush S, Carriedo L, Fulop D, Martinez CC, Peng J, Maloof JN, Sinha NR (2014) **Resolving distinct genetic regulators of tomato leaf shape within a heteroblastic and ontogenetic context.** *Plant Cell.* 26:3616-29

- DOI: <http://doi.org/10.1105/tpc.114.130112>
- Dryad: <https://datadryad.org/stash/dataset/doi:10.5061%2Fdryad.4r267>

21. Ichihashi Y, Aguilar-Martínez JA, Farhi M, Chitwood DH, Kumar R, Millon LV, Peng J, Maloof JN, Sinha NR (2014) **Evolutionary developmental transcriptomics reveals a gene network module regulating interspecific diversity in plant leaf shape.** *Proc Natl Acad Sci USA.* 111:E2616-21

- DOI: <http://doi.org/10.1073/pnas.1402835111>

20. Chitwood DH, Ranjan A, Martinez CC, Headland LR, Thiem T, Kumar R, Covington MF, Hatcher T, Naylor DT, Zimmerman S, Downs N, Raymundo N, Buckler ES, Maloof JN, Aradhya M, Prins B, Li L, Myles S, Sinha N (2014) **A modern ampelography: a genetic basis for leaf shape and venation patterning in grape.** *Plant Physiol.* 164:259-72

• DOI: <http://doi.org/10.1104/pp.113.229708>

• Dryad (data):

<https://datadryad.org/stash/dataset/doi:10.5061%2Fdryad.4d786>

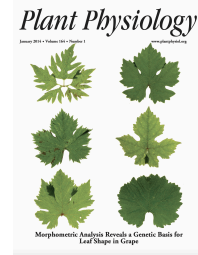
• Dryad (photos):

<https://datadryad.org/stash/dataset/doi:10.5061%2Fdryad.g79cnp5mn>

• Mosaic poster:

[https://figshare.com/articles/figure/Vitis\\_vinifera\\_mosaic/701557](https://figshare.com/articles/figure/Vitis_vinifera_mosaic/701557)

• Featured cover article, January issue



Assistant Member, Donald Danforth Plant Science Center, start date: fall 2013

19. Chitwood DH\*, Kumar K\*, Headland LR, Ranjan A, Covington MF, Ichihashi Y, Fulop D, Jiménez-Gómez JM, Peng J, Maloof JN, Sinha NR (2013) **A quantitative genetic basis for leaf morphology in a set of precisely defined tomato introgression lines.** *Plant Cell.* 25:2465-81

• DOI: <http://doi.org/10.1105/tpc.113.112391>

• Dryad: <https://datadryad.org/stash/dataset/doi:10.5061%2Fdryad.rm5v5>

18. Koenig D, Jiménez-Gómez JM, Kimura S, Fulop D, Chitwood DH, Headland LR, Kumar R, Covington MF, Devisetty UK, Tat AV, Tohge T, Bolger A, Schneeberger K, Ossowski S, Lanz C, Xiong G, Taylor-Teeple M, Brady SM, Pauly M, Weigel D, Usadel B, Fernie AR, Peng J, Sinha NR, Maloof JN (2013) **Comparative transcriptomics reveals patterns of selection in domesticated and wild tomato.** *Proc Natl Acad Sci USA.* 110:E2655-62

• DOI: <http://doi.org/10.1073/pnas.1309606110>

17. Chitwood DH, Maloof JN, Sinha NR (2013) **Dynamic transcript profiles between tomato and a wild relative reflect distinct developmental architectures.** *Plant Physiol.* 162:537-52

• DOI: <http://doi.org/10.1104/pp.112.213546>

16. Chitwood DH & Sinha NR (2013) **A census of cells in time: quantitative genetics meets developmental biology.** *Curr. Opin. Plant Biol.* 16:92-9

• DOI: <http://doi.org/10.1016/j.pbi.2012.11.003>

15. Kumar R, Ichihashi Y, Kimura S, Chitwood DH, Headland LR, Peng J, Maloof JN, Sinha NR (2012) **A high-throughput method for Illumina RNA-Seq library preparation.** *Front. Plant Sci.* 3:202

• DOI: <http://doi.org/10.3389/fpls.2012.00202>

14. Chitwood DH, Naylor DT, Thammapichai P, Weeger AC, Headland LR, Sinha NR (2012c) **Conflict between intrinsic leaf asymmetry and phyllotaxis in the resupinate leaves of *Alstroemeria psittacina*.** *Front. Plant Sci.* 3:182

• DOI: <http://doi.org/10.3389/fpls.2012.00182>

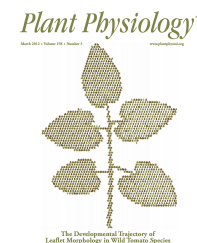
13. Chitwood DH, Headland LR, Ranjan A, Martinez CC, Braybrook SA, Koenig DP, Kuhlemeier C, Smith RS, Sinha N (2012b) **Leaf asymmetry as a developmental constraint imposed by auxin-dependent phyllotactic patterning.** *Plant Cell.* 24:2318-27

• DOI: <http://doi.org/10.1105/tpc.112.098798>

12. Chitwood DH, Headland LR, Kumar R, Peng J, Maloof JN, Sinha NR (2012a) **The developmental trajectory of leaflet morphology in wild tomato species.** *Plant Physiol.* 158:1230-1240

• DOI: <http://doi.org/10.1104/pp.111.192518>

• Featured cover article, March issue



11. Chitwood DH\*, Headland LR\*, Filiault DL, Kumar R, Jiménez-Gómez JM, Schragger AV, Park DS, Peng J, Sinha NR, Maloof JN (2012) **Native environment modulates leaf size and response to simulated foliar shade across wild tomato species.** *PLOS ONE*. 7:e29570

• DOI: <http://doi.org/10.1371/journal.pone.0029570>

Post-doc in Neelima Sinha Lab at UC Davis, start date: summer 2009

---

10. Chitwood DH & Timmermans MC (2010) **Small RNAs are on the move.** *Nature*. 467:415-419

• DOI: <http://doi.org/10.1038/nature09351>

9. Husbands AY, Chitwood DH, Plavskin Y, Timmermans MC (2009) **Signals and prepatterns: new insights into organ polarity in plants.** *Genes & Dev*. 23:1986-1997

• DOI: <http://doi.org/10.1101/gad.1819909>

8. Chitwood DH, Nogueira FT, Howell MD, Montgomery TA, Carrington JC, Timmermans MC (2009) **Pattern formation via small RNA mobility.** *Genes & Dev*. 23:549-554

• DOI: <http://doi.org/10.1101/gad.1770009>

7. Nogueira FT\*, Chitwood DH\*, Madi S, Ohtsu K, Scanlon MJ, Schnable PS, Timmermans MC (2009) **Regulation of small RNA accumulation in the maize shoot apex.** *PLoS Genet*. 5:e1000320

• DOI: <http://doi.org/10.1371/journal.pgen.1000320>

6. Chitwood DH & Timmermans MC (2007) **Target mimics modulate miRNAs.** *Nat. Genet*. 39:935-936

• DOI: <http://doi.org/10.1038/ng0807-935>

5. Nogueira FT, Madi S, Chitwood DH, Juarez MT, Timmermans MC (2007) **Two small regulatory RNAs establish opposing fates of a developmental axis.** *Genes & Dev*. 21:750-755

• DOI: <http://doi.org/10.1101/gad.1528607>

4. Chitwood DH, Guo M, Nogueira FT, Timmermans MC (2007) **Establishing leaf polarity: The role of small RNAs and positional signals in the shoot apex.** *Development*. 134:813-823

• DOI: <http://doi.org/10.1242/dev.000497>

3. Irvine DV, Zaratiegui M, Tolia NH, Goto DB, Chitwood DH, Vaughn MW, Joshua-Tor L, Martienssen RA (2006) **Argonaute slicing is required for heterochromatic silencing and spreading.** *Science*. 313:1134-1137

• DOI: <http://doi.org/10.1126/science.1128813>

2. Nogueira FT, Sarkar AK, Chitwood DH, Timmermans MC (2006) **Organ polarity in plants is specified through the opposing activity of two distinct small regulatory RNAs.** *CSHL Symp. on Quant. Biol*. 71:157-164

• DOI: <http://doi.org/10.1101/sqb.2006.71.045>

PhD studies in Marja Timmermans Lab at Cold Spring Harbor Laboratory,  
start date: fall 2004

---

1. Lee JY, Baum SE, Alvarez J, Patel A, Chitwood DH, Bowman JL (2005) **Activation of CRABS CLAW in the nectaries and carpels of Arabidopsis.** *Plant Cell*. 17:25-36

• DOI: <http://doi.org/10.1105/tpc.104.026666>

Undergraduate research in John Bowman Lab at University of California, Davis

---

Pre-prints (not peer-reviewed)

Pre-print: Frank M<sup>BC</sup>, Komarov S, Wang Q, Li K, Hecking M, Fowler H, Ravenburg C, Widmier A, Johnson A, Thomas H, Coneva V<sup>P</sup>, Chitwood DH, Tai YC (2022) **Integrated PET and confocal informs a functional timeline for the dynamic process of vascular reconnection during grafting.** *bioRxiv*.

- Pre-print: <https://doi.org/10.1101/2022.10.27.513862>
- 2x postdoc

Pre-print: Kayla M<sup>G</sup>, Ophelders T<sup>P</sup>, Quigley M<sup>P</sup>, Munch E<sup>C</sup>, Chitwood D, Dowtin A (2020) **Automatic Tree Ring Detection using Jacobi Sets.** *arXiv*.

- Pre-print: <https://arxiv.org/abs/2010.08691>
- GitHub: [https://github.com/makelaka/tree\\_cookies](https://github.com/makelaka/tree_cookies)
- 1x grad, 2x postdoc

Pre-print: Huang P, Wilson M, Mayfield-Jones D, Coneva V, Frank M, Chitwood DH (2017) **The evolution of Western tonality: a corpus analysis of 24,000 songs from 190 composers over six centuries.** *SocArXiv*.

- Pre-print: <https://doi.org/10.17605/OSF.IO/BTSHK>
- GitHub: <https://github.com/DanChitwood/MIDIocre>

Pre-print: Bush SM, Carriedo L, Fulop D, Ichihashi Y, Covington MF, Kumar R, Ranjan A, Chitwood DH, Headland L, Filiault D, Jimenez-Gomez J, Sinha NR, Maloof JN (2015) **Auxin signaling is a common factor underlying natural variation in tomato shade avoidance.** *bioRxiv*.

- Pre-print: <http://doi.org/10.1101/031088>

## Personnel

Cumulatively 30 personnel: 8 post-docs, 3 graduate students, 3 graduate student advisees for which I am not major advisor, 1 technician, 11 undergraduates, 2 rotation students, 2 visiting scholars.

### Current positions of former lab members:

**Dr. Sarah Percival**, Assistant Professor, University of New Mexico, Dept. Mathematics and Statistics

**Dr. Michelle Quigley**, Assistant Research Professor, Penn State Energy and Environmental Sustainability Laboratories, Center for Quantitative Imaging, USA

**Dr. Sourabh Palande**, Research Scientist, Donald Danforth Plant Science Center, USA

**Dr. Erik Amézquita**, Preparing Future Faculty—Faculty Diversity (PFFFD) Fellow at University of Missouri (Mizzou), Columbia, MO, USA

**Dr. Zoë Migicovsky**, Assistant Professor, Canada Research Chair (Tier 2) in Agri-Food and Sustainable Agriculture, Acadia University, Canada

**Joey Mullins**, Laboratory Technician, Northwestern Memorial Hospital, Chicago, USA

**Kayla Makela**, Accounting Assistant, Opportunity Resource Fund, Michigan, USA

**Dr. Tim Ophelders**, Assistant Professor, Utrecht University and Eindhoven University of Technology, The Netherlands

**Mitchell Eithun**, Mathematics Teacher, Detroit Country Day School, Michigan, USA

**Dr. Margaret Frank**, Assistant Professor, Cornell University, USA

**Dr. Mao Li**, Senior Research Scientist/Principal Investigator, Donald Danforth Plant Science Center, USA

**Dr. Viktoriya Coneva**, Molecular Biology Scientist, Centro de Tecnologia Canavieira, St. Louis, USA

### Post-docs:

*2024-present* **Dr. Yemeen Ayub**. Post-doc. Project: Applying Topological Data Analysis (TDA) to predictive modeling between large datasets and exploring new ways to describe data, such as the Euler characteristic transform

*2021-2024* **Dr. Sarah Percival**. Post-doc. Project: Applying Topological Data Analysis (TDA) to X-ray CT images of growing *Arabidopsis* plants and time courses of gene expression

*2020-2023* **Dr. Sourabh Palande**. Post-doc. Project: applying TDA to gene expression networks and X-ray CT images to predict phenotype from molecular profiles

- 2018-2023 **Dr. Michelle Quigley.** Post-doc. 30% with Dr. Liz Munch. Project: developing Topological Data Analysis (TDA) methods for X-ray Computed Tomography (CT) reconstructions
- 2018-2020 **Dr. Tim Ophelders.** Post-doc. 70% with Dr. Liz Munch. Project: developing Topological Data Analysis (TDA) methods for X-ray Computed Tomography (CT) reconstructions
- 2017-2022 **Dr. Zoë Migicovsky.** Post-doc. Project: Adapting Perennial Crops for Climate Change: Graft Transmissible Effects of Rootstocks on Grapevine Shoots
- 2016-2017 **Dr. Mao Li.** Post-doc. Project: using persistent homology to compare leaf and root morphology
- 2014-2017 **Dr. Viktoriya Coneva.** Post-doc. Project: mapping leaf succulence genes in tomato and developing *Caulerpa taxifolia* as a model of plant development without multicellularity
- 2014-2017 **Dr. Margaret Frank.** Post-doc. Project: graft-transmissible signals and phenotypes in tomato

Graduate students:

- 2018-2023 **Erik José Amézquita Morataya, PhD.** 50% with Dr. Liz Munch. Graduate student. Project: developing Topological Data Analysis (TDA) methods for X-ray Computed Tomography (CT) reconstructions
- 2020-2021 **Kayla Makela.** Graduate student. Project: developing algorithms to isolate anatomical features of tree cookies and dendrochronology
- 2018-2019 **Mitchell Eithun, MS.** 50% with Dr. Liz Munch. Graduate student. Project: developing Topological Data Analysis (TDA) methods for X-ray Computed Tomography (CT) reconstructions

Graduate student advisees (not major advisor):

- 2023-2024 **Remy Liu.** Student with Dr. Arjun Krishnan (University of Colorado Anschutz Medical Campus). Protein structure classification using ECT-CNN methods.
- 2023-2024 **Sarah McGuire.** Student with Dr. Liz Munch. Developing orientation-invariant Euler Characteristic Transform (ECT) Convolutional Neural Network (CNN) methods.
- 2023-present **Asia Hightower.** Student with Dr. Emily Josephs. Leaf morphometrics.

Technicians:

- 2015-2016 **Jesse Angarano.** Lab technician. Project: interspecies grafting studies within the Solanaceae

Undergraduates:

- 2021 **Hannah Kimbrough.** Summer REU student. Project: image analysis of grapevine leaf morphology and domatia
- 2021 **Cassandra Hernández.** Summer REU student. Project: image analysis of grapevine leaf morphology and domatia
- 2018-2022 **Joey Mullins.** Undergraduate. Project: developing Topological Data Analysis (TDA) methods for X-ray Computed Tomography (CT) reconstructions
- 2016 **Halley Fowler.** Summer REU student. Project: graft-transmissible heterosis in tomato
- 2016 **Rebekah Mohn.** Summer REU student. Project: morphometric studies of leaves across species and between disparate organ types
- 2016 **Stephanie Theiss.** Summer REU student. Project: mapping the genetic basis of leaf succulence in tomato
- 2015-2016 **Darren Li.** Summer REU student. Project: morphometric analysis of how climate alters grapevine leaf shape, the genetic basis of cotton leaf shape, and cultural evolution of violin shape
- 2015-2016 **Tommy Yu.** Summer REU student. Project: morphometric analysis of how climate alters grapevine leaf shape, the genetic basis of cotton leaf shape, and cultural evolution of violin shape



- 2015 **Susan Rundell.** Summer REU student. Project: morphometric analysis of how climate alters grapevine leaf shape
- 2015 **Quaneisha Woodford.** Summer REU student. Project: morphometric analysis of how climate alters grapevine leaf shape
- 2014 **Carolyn Highland.** Summer REU student. Project: measuring stomatal densities in tomato introgression lines

Rotation students:

- 2020 **Abby Bryson.** Rotation student. Project: finalizing code and analysis for the student-led publication resulting from HRT891a: Foundation in Computational and Plants Science
- 2014 **Kristen Wendt.** WashU rotation student. Project: 3D surface modeling of meristems

Visiting scholars:

- 2023 **Manica Balant.** Visiting graduate student, Institut Botànic de Barcelona. Project: developing morphometric techniques for *Cannabis* leaves.
- 2016 **Melissa Lacey.** Visiting graduate student. Project: developing morphometric techniques to correlate serration shape with leaf physiology

## Teaching

Since joining MSU, I have taught or designed curricula for at least 499 students across at least 7 countries (USA, Mexico, Thailand, Laos, Vietnam, Colombia, Switzerland). At least 116 students have been included as co-authors in participatory research.

Teaching at Michigan State University:

**HRT 841: Foundation in Computational and Plant Science | UNAM Temas selectos:**

**bioinformática y minería de datos con python.** Michigan State University, 3 credits, graduate, and UNAM campuses across México. Co-taught with Dr. Alejandra Rougon (ENES León) and Dr. Robert VanBuren (MSU). Data analysis, algorithmic thinking, model building, bioinformatics, and molecular biology all implemented using coding and computational resources. No prior coding experience required. The flipped classroom design for this course allows anybody to learn to code in Python using plant examples. The materials for this course are public and can be downloaded at the following link:

<https://plantsandpython.github.io/PlantsAndPython>. **Fall 2019**, 26 students. **Fall 2020**, 16 students. **Fall 2021**, 27 MSU students, 33 UNAM students. **Fall 2022**, 17 MSU students, 15 UNAM students. **Fall 2023**, 20 MSU students, 16 UNAM and other students from México, 13 students from Mekong countries Thailand, Laos, and Vietnam. **Fall 2024**, 9 MSU students, 18 UNAM students.

**CMSE 201: Introduction to Computational Modeling**, Michigan State University, 4 credits, undergraduate. Computational modeling using a wide variety of application examples. Algorithmic thinking, dataset manipulation, model building, data visualization, and numerical methods all implemented as programs in Python. No prior coding experience required. **Spring 2019**, 30 students. **Fall 2021**, 32 students. **Fall 2023**, 59 students.

**Plant Genomics @ MSU REU program**, Plants & Python Introduction to Coding. Together with Dr. Alejandra Rougon (ENES León, México) and Dr. Bob VanBuren (Michigan State University), we provide a 2 week introduction to coding using Plants & Python learning materials (<https://plantsandpython.github.io/PlantsAndPython>) to undergraduate researchers. **Summer 2021**, 20 US students, 9 Mexican students. **Summer 2022**, 18 students. **Summer 2023**, 15 students.

**HRT 812: Laboratory Research Techniques**, Michigan State University. Guest lectures: Students produced their own X-ray CT scan reconstructions of plants or measured the shape of grapevine leaves, explored and visualized data, and made a presentation of their results to the class. 2 credits. **Fall 2018**, **Fall 2021**, **Fall 2023**, 11 students.

**VEN 101A: Viticultural Practices**, University of California, Davis, Guest Lectures: provided a lecture on ampelography and students participated in a class project measuring the shapes of grapevine leaves. **Fall 2023**, 37 students.

**Plants&Python coding workshop in Oaxaca, México**, A workshop provided in conjunction with the XX Sociedad Mexicana de Bioquímica National Plant Biochemistry and Molecular Biology Congress together with Dr. Alejandra Rougón Cardoso (ENES León) (<https://colab.research.google.com/drive/1hvEFopbv6Yuw5INTbsd-g4b5SOA3eAC7?usp=sharing>). The workshop was given at the Centro Cultural San Pablo on 16 October 2023, the space donated by Fundación Alfredo Harp Helú, which maintains the center to support the indigenous cultures of Oaxaca. **Fall 2023**, 40 students from throughout México.

**PLB 2410: Introductory Plant Diversity and Evolution**, Cornell University, Guest Lectures: a tutorial to ImageJ/FIJI is provided to students ([https://docs.google.com/document/d/13xRE1uzQWn-bb44\\_tcofwtEs\\_kVNkelOKJJWpWaA85I/edit?usp=sharing](https://docs.google.com/document/d/13xRE1uzQWn-bb44_tcofwtEs_kVNkelOKJJWpWaA85I/edit?usp=sharing)) so that they can explore plant anatomy and morphology using a variety of X-ray Computed Tomography (CT) scans ([https://drive.google.com/drive/folders/1-tX1vQTIBPZ5NtbgT3n07X14w-RAQNJ?usp=share\\_link](https://drive.google.com/drive/folders/1-tX1vQTIBPZ5NtbgT3n07X14w-RAQNJ?usp=share_link)). A second lecture introduces students to Topological Data Analysis (TDA) methods to analyze X-ray CT data. **Fall 2020, Fall 2021, Fall 2022**.

**HRT 892: Seminar in plant phenomics**, Michigan State University, 1 credit, graduate. Students choose and present papers in plant phenomics research and contribute to planning the Corteva-PBGB-IRT IMPACTS Plant Phenomics Symposium. **Fall 2019**, 18 students.

Teaching at Washington University in St. Louis:

- 2016 **BIO 5702: Current Approaches in Plant and Microbial Research**, Washington University in St. Louis. Guest lectures: Introduction to R, multivariate statistics, and phenotyping using candy as a teaching tool. GitHub: <https://goo.gl/kDwNIg>.
- 2015 **Core Studio 317, Sam Fox School of Design**, Washington University in St. Louis. Guest lecture: Shape as Information, Structure as Function, and Design as Inspiration
- 2015 **BIO 4025: Current Approaches in Plant and Microbial Research**, Washington University in St. Louis. Guest lectures: Introduction to R, multivariate statistics, phenotyping, and quantitative genetics
- 2014-2015 **Cellular transformation/Cellular architecture: a dynamic form**, Sam Fox School of Design & Visual Arts, Washington University in St. Louis. Guest lecture: Shape as Information, Structure as Function, and Design as Inspiration
- 2014 **BIO 4025: Current Approaches in Plant and Microbial Research**, Washington University in St. Louis. Guest lecture: Introduction to Quantitative Genetics

Teaching at University of California at Davis:

- 2013 **Morphometrics tutorial**, USDA and Cornell Dept. of Horticulture, Geneva, NY. An introduction to ImageJ, R, Principal Component Analysis, Generalized Procrustes Analysis, and Elliptical Fourier Descriptor Analysis.
- 2012-2013 **PBI 220/227: Graduate seminar in plant biology**, University of California, Davis. Guest lecture: QTL analysis in the genomics era
- 2011, 2013 **PBI 220/227: Graduate seminar in plant biology**, University of California, Davis. Guest lecture: RNAi and plant development
- 2009-2012 **Tomato Genome Project, Undergraduate Summer Research Program**. Directed 3 – 5 undergraduates recruited from historically excluded groups in the Sacramento area each summer in genetic field research. Interns learned cutting-edge technologies (such as next-generation sequencing) and advanced statistical and bioinformatic analyses that are applied to the analysis of tomato introgression lines.

Teaching at Cold Spring Harbor Laboratory:

- 2005 **Dolan DNA Learning Center**, Cold Spring Harbor, NY. Lecturer: introduction to molecular biology lab

Dissertation and Thesis committees

2024	PhD Dissertation committee, Sarah McGuire, Munch Lab, Michigan State University, Dept. Computational Mathematics, Science & Engineering
2023-2024	PhD Dissertation committee, Serena Lotreck, VanBuren and Ghassemi Labs, Michigan State University, Depts. Plant Biology and Computational Mathematics, Science & Engineering
2021-present	PhD Dissertation committee, Ross Hatlen, Miles Lab, Michigan State University, Dept. Plant, Soil & Microbial Sciences
2021-2022	MS Thesis committee, Noelle Connors, Brainard Lab, Michigan State University, Dept. Horticulture
2021-present	PhD Dissertation committee, Asia Hightower, Josephs Lab, Michigan State University, Dept. Plant Biology
2019-2024	PhD Dissertation committee, Eleanore Ritter, Niederhuth Lab, Michigan State University, Dept. Plant Biology
2018-2020	MS Thesis committee, Erika LaPlante, Weber Lab, Michigan State University, Dept. Plant Biology
2018-2021	PhD Dissertation committee, Sonal Gupta, Regina Baucom Lab, University of Michigan, Dept. Ecology & Evolutionary Biology
2018-2023	PhD Dissertation committee, Erik Amézquita, Chitwood/Munch Labs, Michigan State University, Dept. Computational Mathematics, Science & Engineering
2018-2020	MS Thesis committee, Mitchell Eithun, Chitwood/Munch Labs, Michigan State University, Dept. Computational Mathematics, Science & Engineering
2016	Qualifying examination, Leo (Liewei) Yan, Hani Zaher Lab, Washington University in St. Louis, Depts. Biology and Plant & Microbial Sciences.
2014	External PhD Dissertation examiner: Diana Bernal-Franco, Daniel Ortiz-Barrientos Lab, University of Queensland, School of Biological Sciences
2014-2017	PhD Dissertation committee, Amanda Bender, Alex Bradley Lab, Washington University in St. Louis, Dept. Earth, Environmental, and Planetary Sciences
2013-2017	PhD Dissertation committee, Laura Klein, Allison Miller Lab, Saint Louis University, Dept. Biology
2013-2019	PhD Dissertation committee, Melissa Lacey, Liz van Volkenburgh Lab, University of Washington, Dept. Biology

Service

2024	Reappointment review committee, MSU Dept. Forestry
2022-present	MSU Dept. CMSE Undergraduate Study Committee
2021-2023	Organizing committee for the 2023 Sociedad Mexicana de Bioquímica meeting
2021-2024	MSU Dept. HRT Graduate Program Committee (GPC), curriculum sub-committee
2021-2022	American Society of Plant Biology (ASPB) Programming Committee
2019-2021	Organizing committee for the 2021 Sociedad Mexicana de Bioquímica meeting
2019	Coordinator with Dr. Addie Thompson of the student organized MSU Corteva-PBGB-NRT IMPACTS Plant Phenomics Symposium
2019	Special issue editor on "Shape", Green Life Symposium, International Journal of Plant Sciences
2018-2020	MSU NRT IMPACTS Executive Committee
2018-2020	MSU NRT IMPACTS Curriculum Sub-committee (Chair)
2018-2020	MSU Dept. CMSE Frontiers Workshop Committee
2015-2016	Frontiers Research Topic: Plant morphological modeling (Co-organizer with Alex Bucksch)
2015-2016	Special issue on Plant Development, <i>Developmental Biology</i> (Co-organizer with Vivian Irish)

2015	NIMBioS Morphological Plant Modeling Workshop (Co-organizer with Alex Bucksch)
2015	Donald Danforth Center Fall Symposium, “Darwin to Borlaug”, Organizing Committee
2014-2017	Oversight committee: Integrated Microscopy Facility (Donald Danforth Center)
2014-2017	Oversight committee: Institutional Biosafety Committee (Donald Danforth Center)
2013-2017	Oversight committee: Postdoc Ethics Training (Donald Danforth Center)
2013-2015	Oversight committee: Bellwether Phenotyping Facility (Donald Danforth Center)
2011-2017	Review Editorial Board, <i>Frontiers in Plant Development</i>

## Proposals, Grants, and Funding

### **Funding for research**

2023-2026	NSF, PI Dan Chitwood (Michigan State University) co-submitted with PI Aman Husbands (University of Pennsylvania) and PI Arjun Krishnan (University of Colorado Anschutz Medical Campus) with co-PIs Liz Munch (MSU), Bob VanBuren (MSU), and Sr. Per. Alejandra Rougon-Cardoso (ENES UNAM León). Award numbers IOS-2310355, IOS-2310356, and IOS-2310357. Collaborative Research: RESEARCH-PGR: Predicting phenotype from molecular profiles with deep learning: Topological Data Analysis to address a Grand Challenge in the plant sciences. Total award: \$1,500,000. Collaborative awards: \$639,998 (MSU), \$526,084 (UPenn), \$333,918 (UColorado). Precise dates: 1 June 2023 - 31 May 2026. <ul style="list-style-type: none"> <li>• NSF website: <a href="https://www.nsf.gov/awardsearch/showAward?AWD_ID=2310355">https://www.nsf.gov/awardsearch/showAward?AWD_ID=2310355</a></li> <li>• Press release: <a href="https://www.canr.msu.edu/news/msu-researchers-receive-nsf-grant-to-address-gr-and-challenge-of-plant-biology">https://www.canr.msu.edu/news/msu-researchers-receive-nsf-grant-to-address-gr-and-challenge-of-plant-biology</a></li> </ul>
2021-2023	Internal award through MSU Dept. Biochemistry and Molecular Biology: Led by Drs. Beronda Montgomery and Arjun Krishnan (BMB) together with Dr. Liz Munch (CMSE/Mathematics) and Dr. Aman Husbands (The Ohio State University). Funding for two years for a Research Associate.
2016/18-2024	NSF PGRP, PI Allison Miller (Saint Louis University). #1546869. RESEARCH-PGR: Adapting perennial crops for climate change: graft transmissible effects of rootstocks on grapevine shoots. Total award: \$4,647,589.00. Original subaward: \$926,896. Subaward as recorded by MSU after moving there: \$657,169.47 and after amendment on 4 Nov 2021, \$603,845.18. Original start date in 2016. Precise dates after moving to MSU 1 Jan 2018: 1 Sep 2019 - 31 Aug 2022 (but there was a no-cost extension to 2023). <ul style="list-style-type: none"> <li>• NSF website: <a href="https://www.nsf.gov/awardsearch/showAward?AWD_ID=1546869">https://www.nsf.gov/awardsearch/showAward?AWD_ID=1546869</a></li> <li>• Project website: <a href="http://www.vitisunderground.org/">http://www.vitisunderground.org/</a></li> </ul>
2015-2017	DOE, PI Daniel Schachtman (University of Nebraska). Systems analysis of the physiological and molecular mechanisms of sorghum nitrogen use efficiency, water use efficiency, and interactions with the soil microbiome. Total award: \$13,500,000. Subaward: \$604,780.

### **Funding for student training**

2022-2025	NSF, PI Cornelius Barry (Michigan State University). #2149531. Plant Genomics @ Michigan State University. Total award: \$374,498. Precise dates: 1 Mar 2022 - 28 Feb 2025. Amendment date: 26 Jan 2022 <ul style="list-style-type: none"> <li>• NSF website: <a href="https://www.nsf.gov/awardsearch/showAward?AWD_ID=2149531">https://www.nsf.gov/awardsearch/showAward?AWD_ID=2149531</a></li> <li>• Project website: <a href="https://plantgenomics.natsci.msu.edu/">https://plantgenomics.natsci.msu.edu/</a></li> </ul>
2021-2022	Internal award through MSU CANR 2021 Global Scholars Program. PIs Dan Chitwood and Bob VanBuren in collaboration with Alejandra Rougon-Cardoso (UNAM ENES León). An award to expand <i>HRT841: Foundations in Plant and Computational Sciences</i> , internationally to México using virtual technology. Total award: \$10,000.

- 2018-2023 NSF NRT, PI Shinhan Shiu (Michigan State University). #1828149: NRT-HDR: Intersecting computational and data science to address grand challenges in plant biology. Total grant award: \$2,999,052.00. Subaward: \$0. Precise dates: 15 Aug 2018 - 31 Aug 2023.
- NSF website: [https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1828149](https://www.nsf.gov/awardsearch/showAward?AWD_ID=1828149)
  - Project website: <https://impacts.natsci.msu.edu/>

### **Funding for X-ray Computed Tomography (CT) services**

- 2021-2025 USDA-NIFA, PI Andrey Guber (Michigan State University). Micro-Scale Biophysical Frameworks Promoting C Gains in Cover Crop-Based Systems. Total award: \$749,999.24. Precise dates: 1 Nov 2021 - 31 Oct 2025. Subaward: \$49,750 (two years X-ray CT maintenance)
- 2020-2022 NSF, PI Brian O'Shea (Michigan State University). #2018432. CC\* Networking Infrastructure: A Science DMZ for Quantitative Biology and Precision Agriculture. Total grant award: \$483,122. Subaward: \$0. Precise dates: 1 Jul 2020 - 30 Jun 2022
- 2019-2024 NSF, PI Alexandra "Sasha" Kravchenko (Michigan State University). #1904267. Role of transport processes in formation of optimal microbial habitats and the root-microbe-soil carbon accrual continuum. Total award: \$624,995. Subaward: \$10,000. Precise dates: 1 May 2019 - 30 April 2024.
- 2019-2023 USDA, PI Alexandra "Sasha" Kravchenko (Michigan State University). A new perspective for plant diversity and carbon sequestration: interactions between physical micro-environments and microorganisms. Total proposed award: \$499,999.29. Subaward: \$45,000. Precise dates: 15 April 2019 - 14 April 2023.

### Certification

- 2023 Level 2 ASNT No. SNT-TC-1A / NAS 410 Personnel Qualification and Certification in Nondestructive Testing. Advanced CT / CT Level 2. 40 hours. 17-21 July 2023, North Star Imaging, Rogers, Minnesota.
- 2023 Level 1 ASNT No. SNT-TC-1A / NAS 410 Personnel Qualification and Certification in Nondestructive Testing. DR / CT Level 1. 40 hours. 12-16 June 2023, North Star Imaging, Rogers, Minnesota.

### Presentations, Posters, Exhibits, Interviews

- 2024 Seminar, From images to insights: using Topological Data Analysis to extract information from data. INARI: the SEEDesign Company™, 18 November 2024.
- 2024 Seminar, Undocumented/unacknowledged: the vital contributions of México to US agriculture and academia. Michigan State University, Office of Culture, Access, & Belonging, Third Thursday Talks, 24 October 2024.
- 2024 Seminar, Data and images as shapes: using Topological Data Analysis to extract information from data. Plant Genome Research Program annual meeting at the National Science Foundation, Alexandria, Virginia, 5-6 September 2024.
- 2024 Seminar, Images as shapes: using Topological Data Analysis to extract information from data. The Imageomics Institute. The Ohio State University, College of Engineering, 6 May 2024.
- 2023 Interviewed and quoted in the *Washington Post* visual data science journalism article "Why do trees have differently shaped leaves?" by Leslie Shapiro, published 16 Nov 2023
- 2023 <https://www.washingtonpost.com/science/interactive/2023/leaf-shape-diversity>
- 2023 Seminars, Perspective matters: a topological view of plant morphology and training in the computational sciences / Reading the leaves and rootstocks of wine grapes: Lessons at the intersection of climate, people, and plants. Kravis Department of Integrated Sciences at Claremont McKenna College, 18 September 2023.

- 2023 Seminar, Images as shape: using Topological Data Analysis to extract information from data. Kavli Institute for Theoretical Physics (KITP) at UC Santa Barbara, part of a longer workshop, Dynamics of Self-Organization in Animal and Plant Development, that I participated in for two weeks, 31 July - 11 August 2023.
- 2023 DEI seminar for the MSU Advanced Computational Research Experiences (ACRES) REU program, Perspective matters: a topological view of plant morphology and training in computational plant sciences, 22 May 2023
- 2023 Seminar, Images as shape: using Topological Data Analysis to extract information from data. ImageXD conference. Irvine, CA. 17 March 2023.
- 2022 Seminar, Plants Through Time Corteva Symposium. UC Riverside. Presentation: Perspective matters: a topological view of plant morphology and training in computational plant sciences. 26 May 2022.
- 2022 Seminar, Berkeley Institute for Data Science. 17 Feb 2022.
- 2021 Seminar, USDA West Virginia Kearneysville. Presentation: We see shape through "lenses": Culture is a lens that shapes our perspectives and science. 13 Dec 2021.
- 2021 Seminar, Eindhoven University of Technology. Presentation: From genotype to phenotype: Extracting information from plant morphology with TDA. 19 April 2021.
- 2021 Seminar, University of Iowa. Presentation: Shape is data and all data have shape: using Topological Data Analysis (TDA) to extract information from nature. 26 March 2021.
- 2021 Seminar, University of Massachusetts, Amherst. Presentation: Topological Data Analysis for Quantifying Plant Morphology. 4 February 2021.
- 2021 Seminar, Instituto de Biología, Universidad Nacional Autónoma de México (UNAM), CDMX. Presentation: Topological Data Analysis for Quantifying Plant Morphology. 26 January 2021. Recording of virtual seminar and questions: [https://www.youtube.com/embed/\\_ZGkUAzpx6E](https://www.youtube.com/embed/_ZGkUAzpx6E)
- 2020 Keynote presentation: Topological Data Analysis for Quantifying Plant Morphology. Meeting on Plant Physiology, Universidade Federal de Viçosa, Minas Gerais, Brasil.
- 2020 Seminar, North Carolina State University Fall Symposium series. Topological Data Analysis for Quantifying Plant Morphology. Virtually at Raleigh, NC.
- 2020 Seminar, Plant Biotechnology for Health and Sustainability Symposium, Michigan State University. Topological Data Analysis for Quantifying Plant Morphology: <https://youtu.be/6Q4LDaIPsfQ>
- 2020 Keynote presentation: Topological Data Analysis for Quantifying Plant Morphology. 9th International Conference on Functional-Structural Plant Models: Towards Computable Plants. Sponsored by Hochschule Geisenheim University and Leibniz Universität Hannover.
- 2020 Herbaria and Machine Learning Workshop. Virtually hosted by Yale, organized by Susan Mazer (UCSB).
- 2020 Seminar, Laboratorio Nacional de Genómica para la Biodiversidad (langebio), Irapuato, México. Presentation: Shape is data and data has shape: finding information in biological form (and learning to code along the way).
- 2020 Seminar, La Escuela Nacional de Estudios Superiores Unidad UNAM León, México. Presentation: Shape is data and data has shape: finding information in biological form (and learning to code along the way).
- 2019 XVIII National Congress of Plant Biochemistry and Molecular Biology, Sociedad Mexicana de Bioquímica, Mérida, Yucatán, México: Topological Data Analysis (TDA) as a method to comprehensively measure the plant form.
- 2019 Seminar, University of Tokyo. Presentation: Topological Data Analysis (TDA) as a method to comprehensively measure the plant form.
- 2019 Japanese Society of Developmental Biologists, Osaka, Japan. Presentation: Topological Data Analysis: What is it? What is it good for? How can it be used to study developmental biology? <https://bit.ly/2HOhxqW>

- 2018 Seminar, University of Minnesota. Presentation: Topological Data Analysis: What is it? What is it good for? How can it be used to study plant morphology?
- 2018 Valent BioSciences. Presentation: Topological Data Analysis 101. Libertyville, IL.
- 2018 UC Davis Plant Science Symposium. University of California, Davis, Davis, CA. Presentation: Topological Data Analysis: What is it? What is it good for? How can it be used to study plant morphology? Pre-recording: <https://youtu.be/ZzUMQjmPYtA>
- 2017 64th Annual Fall Symposium: Next Generation Biology: from Species to Ecosystems. Missouri Botanical Gardens, St. Louis, MO. Presentation: Persistent homology and organismal theory: Quantifying the branching topologies of plants.
- 2017 Donald R. Kaplan Memorial Lecture in Comparative Development. Botanical Society of America, Fort Worth, TX. Presentation: Persistent homology and organismal theory: Quantifying the branching topologies of plants. <https://goo.gl/sabA9Y>
- 2017 Seminar, Carnegie Science, Department of Plant Biology, Stanford. Presentation: Morphometrics and persistent homology: From violins and leaves to the branching topologies of plants. <https://goo.gl/ps1D4S>
- 2017 Seminar, Grape Genetics Research Unit, ARS-USDA, Geneva, NY. Presentation: Turning a new leaf with persistent homology: old and new ways of analyzing leaf shape and the branching topology of plants. <https://goo.gl/Jwucjg>
- 2017 Seminar, Michigan State University. Presentation: Turning a new leaf with persistent homology: old and new ways of analyzing leaf shape and the branching topology of plants.
- 2017 Seminar, UC Riverside. Presentation: Turning a new leaf with persistent homology: old and new ways of analyzing leaf shape and the branching topology of plants.
- 2017 Show Me Grape and Wine Symposium, Grape and Wine Institute, University of Missouri, Columbia. Presentation: Adapting perennial crops for climate change: mixing and matching shoots and roots in grapevine for a changing world.
- 2016 Seminar, Saint Louis University. Presentation: Turning a new leaf with persistent homology: old and new ways of analyzing leaf shape and the topology of plants. <https://goo.gl/8g80ft>
- 2016 Plant Sciences Graduate Student Council, 6th Annual DuPont Plant Sciences Symposium, University of Wisconsin, Madison. Presentation: Turning a new leaf with persistent homology: old and new ways of analyzing leaf shape and the topology of plants. <https://goo.gl/8g80ft>
- 2016 Seminar, University of Missouri, Saint Louis. Presentation: New and old ways of looking at shape: Morphometric analysis of leaves. <https://goo.gl/k7aJjG>
- 2016 Japanese Society of Mathematical Biology, Kyushu University, Fukuoka, Japan. Presentation: New and old ways of looking at shape: Morphometric analysis of leaves. <http://goo.gl/I4lPtw>
- 2016 University of Tokyo, Workshop on Plant Phenotyping. Presentation: New and old ways of looking at shape: Morphometric analysis of leaves. <http://goo.gl/I4lPtw>
- 2016 Interdisciplinary Plant Group Symposium, Heterosis. University of Missouri, Columbia. Presentation: Rootstocks: the other half of the shoot phenotype and heterosis equation. <http://goo.gl/cTKK23>
- 2016 Seminar, Donald Danforth Plant Science Center, Collaboration Symposium. Presentation: What the shapes of grapevine leaves tell us about ancient and future climates. <http://goo.gl/xo7YV6>
- 2016 Seminar, Missouri State, Springfield, MO. Presentation: Discriminating shapes: on violins and the latent morphology of grape leaves. <http://goo.gl/INyt4K>
- 2016 Seminar, Brown University, Department of Ecology & Evolutionary Biology. Presentation: The shapes of leaves across developmental and geologic time. <http://goo.gl/yr2CGM>
- 2016 Cold Spring Harbor Laboratory, NY. Alumnus presentation, graduate student recruitment

- 2015 Invited participant, The National Academies Keck Futures Initiative: Art and Science, Engineering, and Medicine Frontier Collaborations: Ideation, Translation, Realization
- 2015 Seminar, Cinvestav/LANGEBIO, Irapuato, Mexico. Presentation: Reconceptualizing morphology: the architecture of a giant single-celled alga and the latent shapes of grape leaves. <http://goo.gl/ntJfuk>
- 2015 Seminar, University of Vermont, Burlington, Department of Plant Biology. Reconceptualizing morphology: the architecture of a giant single-celled alga and the latent shapes of grape leaves. <http://goo.gl/ntJfuk>
- 2015 Seminar, University of Missouri, Columbia "Mizzou", Interdisciplinary Plant Group. Presentation: Reconceptualizing morphology: the architecture of a giant single-celled alga and the latent shapes of grape leaves. <http://goo.gl/ntJfuk>
- 2015 Seminar, Stanford University Department of Biology. Presentation: Reconceptualizing morphology: the architecture of a giant single-celled alga and the latent shapes of grape leaves. <http://goo.gl/ntJfuk>
- 2015 6th European Phycological Congress, London, UK. Presentation: Comparative analysis of *Caulerpa* and land plant transcriptomes: implications for Kaplan's organismal theory
- 2015 74th Annual Society of Developmental Biology Meeting, Snowbird, UT. Presentation: Plant architecture without multicellularity: An intracellular transcriptomic atlas of a giant, single-celled alga. <http://goo.gl/Xl8Bnm>
- 2015 Science on Tap, Schlafly Bottleworks, St. Louis, MO. Presentation: What leaves & violins say about evolutionary forces that shape us & our culture. <http://goo.gl/zwqjC6>
- 2015 Seminar, University of California, Davis. Presentation: Discriminating shapes: On violins and the latent morphology of grape leaves. <http://goo.gl/8T5uv0>
- 2015 Seminar, University of Illinois, Urbana-Champaign. Presentation: A spectrum of shapes: distinct genetic, developmental, and environmental effects comprise leaf morphology. <http://goo.gl/CfsUza>
- 2014 Media coverage of violin evolution (October). Featured in *The International New York Times*, NPR's *Science Friday*, *The Los Angeles Times*, *Science* magazine, *Scientific American*, *New Scientist*, *El País*, among others.
- 2014 *National Geographic* magazine (October). "The Next Green Revolution", part of the "Future of Food" series. Article, photos, and video interview featuring breeding drought-resistant tomatoes.
- 2014 Seminar, Purdue University, West Lafayette, IN. Presentation: Towards designing a better leaf: natural variation in leaf architecture between tomato and a wild desert relative.
- 2014 Marfa Dialogues, Pulitzer Arts Foundation, St. Louis, MO. "City as Living Laboratory": A walk from the ruins of Pruitt-Igoe to Grand Center with biologists, city designers, architects, and hydrologists discussing sustainability in St. Louis.
- 2014 Seminar, Washington University in St. Louis, MO. Presentation: Quantifying leaf morphology: perspectives on development and natural variation in leaf shape and size.
- 2013 Seminar, Cornell University, Ithaca, NY. Presentation: Quantifying leaf morphology: perspectives on development and natural variation in leaf shape and size.
- 2013 PhenoDays: Imaging & Robotics, Donald Danforth Plant Science Center, St. Louis, MO. Presentation: Quantifying leaf morphology: perspectives on development and natural variation in leaf shape and size.
- 2013 FASEB Mechanisms in Plant Development Conference, Saxtons River, VT. Poster: Chitwood, DH, Kumar, R, Ranjan, A, Pelletier, JM, Harada, JJ, Maloof, JN, Sinha, NR. Shade induced indeterminacy alters early leaf primordium development.



- 2013 Grape Research Coordination Network (GRCN) Conference, Davis, CA. Poster: A modern ampelography: a genetic basis for leaf shape and venation patterning in *Vitis vinifera*.
- 2013 Seminar, USDA/Cornell University, Geneva, NY. Presentation: The quantitative genetics of leaves: examples from tomato and grapevine.
- 2013 Seminar, University of Washington, Dept. of Biology, Seattle. Presentation: The quantitative genetics of leaves: examples from studies of tomato introgression lines.
- 2013 Seminar, Donald Danforth Plant Science Center, St. Louis. Presentation: The quantitative genetics of leaves: examples from studies of tomato introgression lines.
- 2013 Organism: An art show fusing art, science, and technology, U.C. Davis. Exhibit: Tomato Gene Expression, Op. 1. A sonification of gene expression data integrating music, animation, RNA-Seq data, and statistics into a film.
- 2012 "The Dynamics of Plant Biology" Symposium, The Sainsbury Laboratory, Cambridge, UK. Presentation: Quantifying leaf morphology: perspectives on development, environmental regulation, and natural variation in leaf shape and size.
- 2012 Seminar, UC Davis Department of Viticulture & Enology. Presentation: Towards a new ampelography: using systems biology to study natural variation in tomato and grape.
- 2011 CSHL Seminar, concurrent with Plant Genomes & Biotechnology: from Genes to Networks. Presentation: Eco-devo studies in domesticated tomato and its wild relatives.
- 2011 Annual Meeting of the Life Sciences Research Foundation, Baltimore, MD. Poster: Chitwood, DH, Martinez, C, Headland, LR, Ranjan, A, Braybrook, SA, Koenig, DP, Kuhlemeier, C, Smith, RS, Sinha, NR. The forgotten axis of leaf development: Left-right leaf asymmetry is caused by auxin-dependent phyllotactic patterning.
- 2011 MicroMORPH: Microevolution of development within populations and species, Boulder, CO. Presentation: Microevolutionary developmental genomics in domesticated tomato and its wild relatives.
- 2010 Annual Meeting of the Life Sciences Research Foundation, San Francisco, CA. Poster: Chitwood, DH, Headland, L, Maloof, JN, Sinha, NR. Genomic analysis of natural variation and adaptive responses in wild-tomato (*Solanum sect. Lycopersicon*).
- 2010 *Nature* Podcast, September 23, 2010. Interview about small RNA movement, as described in Chitwood and Timmermans, *Nature* (2010).
- 2010 FASEB Mechanisms in Plant Development Conference, Saxtons River, Saxtons River, VT. Presentation: Genomic analysis of adaptive responses in the genus *Solanum*.
- 2008 FASEB Mechanisms in Plant Development Conference, Saxtons River, VT. Poster: Chitwood, DH, Nogueira, FT, Howell, MD, Montgomery, TA, Carrington, JC, Timmermans, MC. Movement of ta-siRNAs and epidermis-derived miRNAs in *Arabidopsis*.
- 2008 67<sup>th</sup> Annual Society for Developmental Biology Meeting, University of Pennsylvania. Poster: Chitwood, DH, Nogueira, FT, Howell, MD, Montgomery, TA, Carrington, JC, Timmermans, MC. Movement of ta-siRNAs and epidermis-derived miRNAs in *Arabidopsis*.
- 2006 Keystone Symposium on RNAi and Related Pathways, Vancouver, BC, Canada. Poster: Nogueira, FT, Chitwood, DH, Juarez, MT, Timmermans, MC. Analysis of the dynamic expression pattern of miR166 during *Arabidopsis* and maize leaf development.

## Review Activity

American Journal of Botany (x4), American Journal of Enology and Viticulture, AoB Plants (x2), Binational Agricultural Research & Development Fund (BARD), Bioinformatics, Biotechnology & Biol. Sciences Research Council (BBSRC), BMC Genomics, Current Biology, Developmental Biology (x2), eLife (x2), Frontiers in Plant Sciences (x9), Gatsby Charitable Foundation, Genome Biology,

GigaScience, Horticulture Research, IEEE/ACM Transactions on Computational Biology and Bioinformatics, International Journal of Plant Sciences (x4), Journal of Integrative Biology, Molecular Breeding, National Science Foundation (x9), Nature Plants, New Phytologist (x11), PeerJ, Planta, The Plant Cell (x6), The Plant Journal (x2), Plant Molecular Biology, Plant Physiology (x7), Plant Science, Plants, People, Planet (x4), PLOS Computational Biology, PLOS Genetics, PLOS ONE (x6), Pre-submission consulting for NSF proposal, Proc. Natl. Acad. Sci. USA, Scientific Reports (x4), Theoretical and Applied Genetics, United Arab Emirates University