School of Life Sciences Faculty Research Areas

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Geomicrobiology

Dr. Aude Picard
Assistant Research Professor
School of Life Sciences
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Expertise

- Anaerobic microbiology
- Microbial physiology
- Biomineralization
- Astrobiology and biosignatures
- Microscopy & spectroscopy

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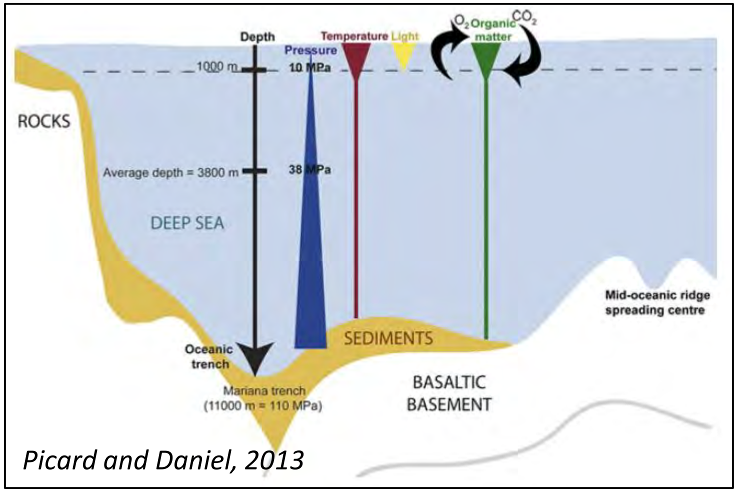
Microbial life in extreme conditions

1 Microbial life under high pressure

◦ What are the pressure limits for microbial life?

High-pressure environments represent the largest habitat for microbial life on Earth



Picard and Daniel, 2013

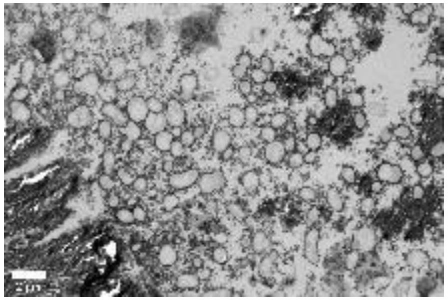
Oceans on icy moons (e.g. Europa) are potential habitats for microbial life in the outer Solar System

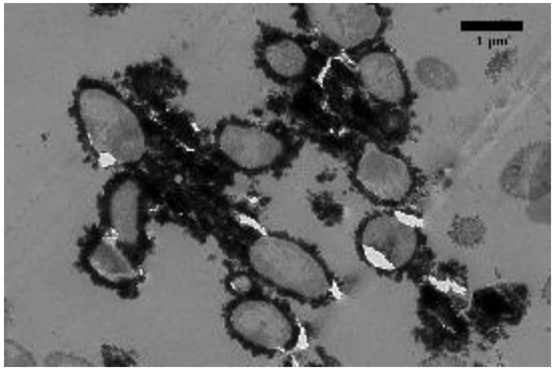
Europa (image credits: NASA)

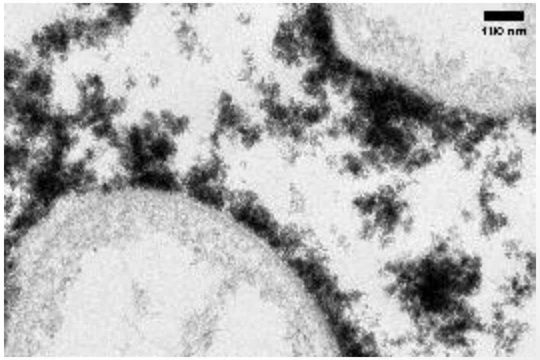
2 Microbe-mineral interactions

◦ How do bacteria cope with mineral encrustation?
◦ Do minerals play a role in long-term survival of bacteria?

Transmission electron microscopy images of bacteria encrusted in iron sulfide minerals







Dryland microbes and soil ecology

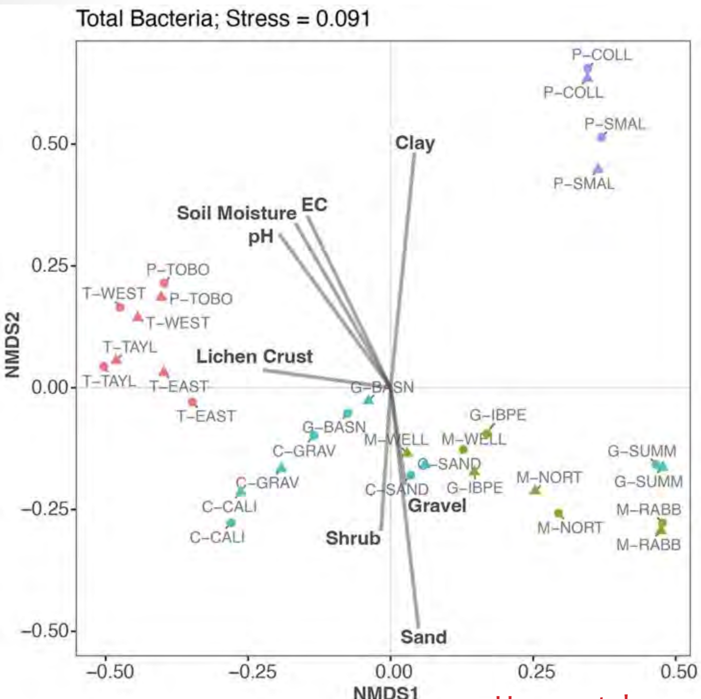
Dr. Nicole Pietrasiak

- Associate Professor of Sustainability in Arid Lands
- School of Life Sciences
- Email: nicole.pietrasiak@unlv.edu

Expertise

- Soil Microbiology and Ecology
- Biological Soil Crusts
- Phycology and Cyanobacteria/Algae Culture Collection
- Soil Science
- Dryland Ecology
- Biogeomorphology

In our lab we investigate what shapes the diversity, abundance, and distribution of desert microbes



Hansen et al. 2023

Landscape and soil properties select for unique microbiomes

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DOI: 10.1111/jpy.12897

WHEN IS A LINEAGE A SPECIES? A CASE STUDY IN *MEXACORYS* GEN. NOV. (SYNECHOCOCCALES: CYANOBACTERIA) WITH THE DESCRIPTION OF TWO NEW SPECIES FROM THE AMERICAS[1]

Nicole Pietrasiak[2]

Plant and Environmental Sciences Department, New Mexico State University, 945 College Drive, Las Cruces, New Mexico 88003, USA

Karina Osorio-Santos

Department of Comparative Biology, Faculty of Science, Universidad Nacional Autonoma de México, Coyoacan, Distrito Federal 04510, México

Sergei Shalygin

Plant and Environmental Sciences Department, New Mexico State University 945 College Drive, Las Cruces, New Mexico 88003, USA

Michael P. Martin

Department of Biology, John Carroll University, University Heights, Ohio 44118, USA

and Jeffrey R. Johansen

Department of Biology, John Carroll University, University Heights, Ohio 44118, USA
Department of Botany, Faculty of Sciences, University of South Bohemia, Branišovská 31, České Budějovice 370 05, Czech Republic

We also describe species and genera new to science and society.

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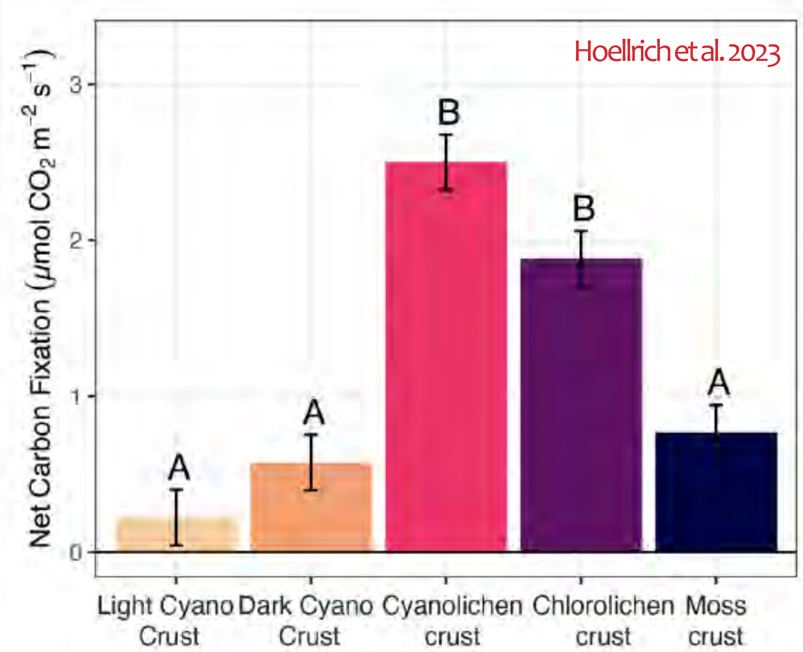
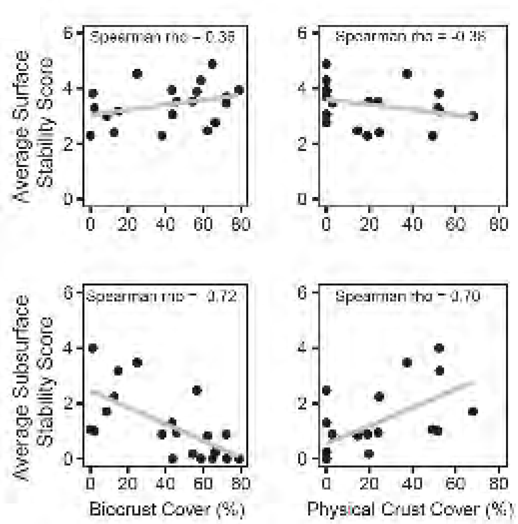
And we identify and quantify the roles microbes play in dryland ecosystem functioning and soil health





Microbes are part of our dryland biodiversity. They prevent soil loss, increase soil fertility, control nutrient cycling, and contribute to carbon sequestration.

Dryland microbes are crucial for maintaining sustainable arid lands.

Stovall et al. 2023

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Behavioral & Evolutionary Genetics

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donald.price@unlv.edu

Expertise

- **Behavioral Genetic Analysis**
- **Quantitative Genetics**
- **Genome-wide Gene Expression Analysis**
- **Adaptative Comparative Genomic Analysis**
- **Hawaiian Evolutionary Biology**
- **Biodiversity and Speciation**

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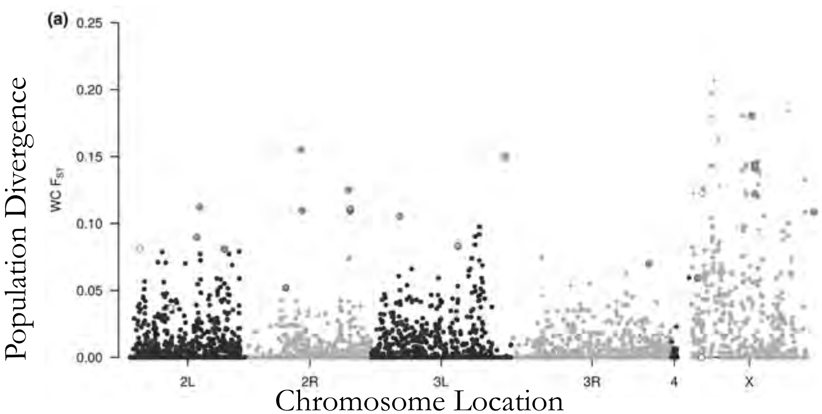
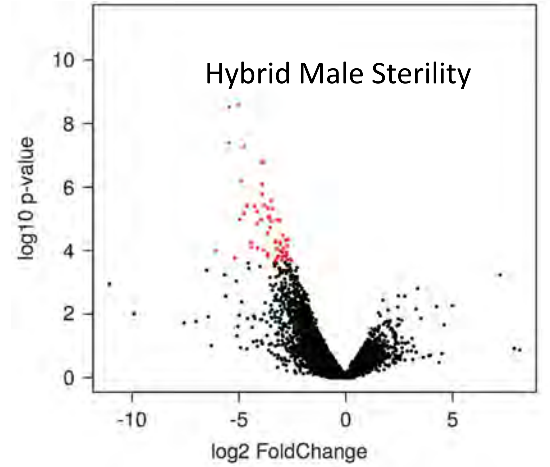
Evolutionary Genetics

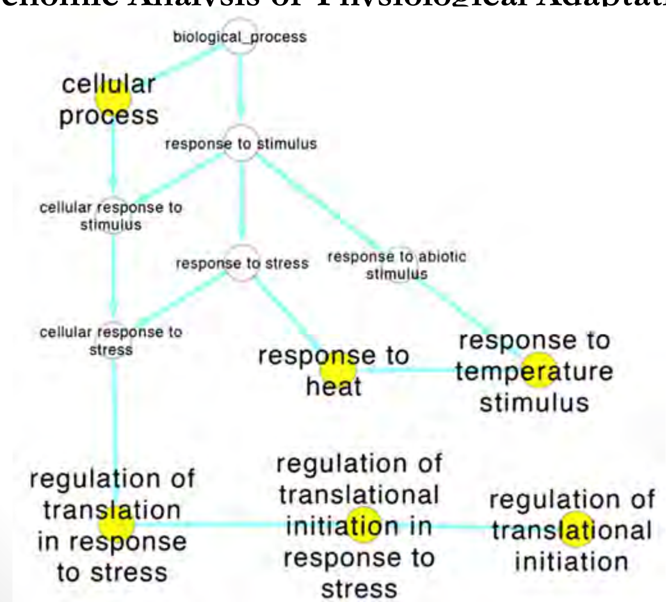
Population Genomic Analysis of Adaptation



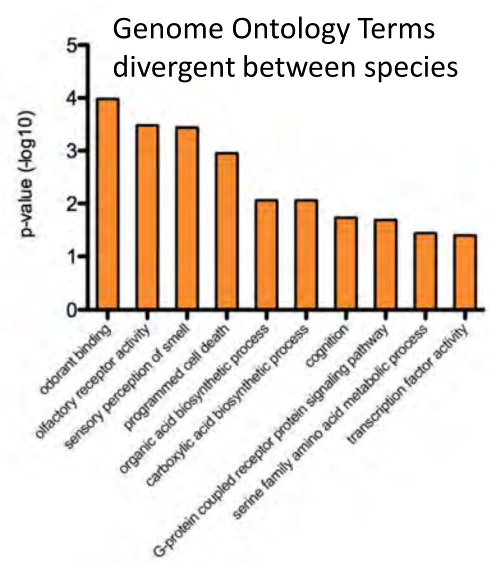
Genome-wide Gene Expression Analysis



Genomic Analysis of Physiological Adaptation

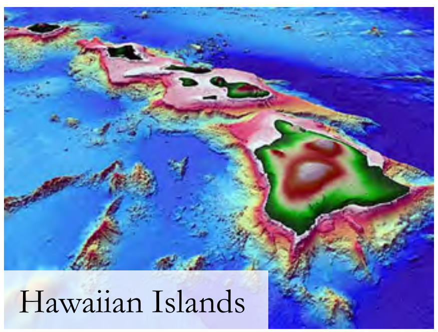


Comparative Genomic Analysis

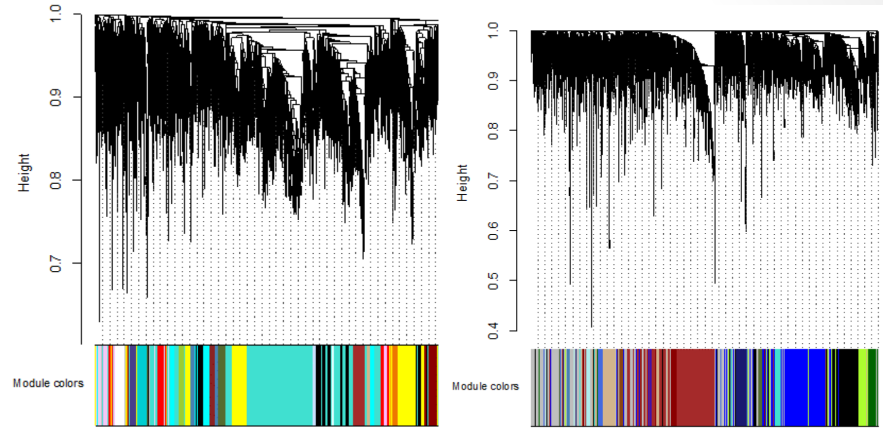


Behavioral Genetics

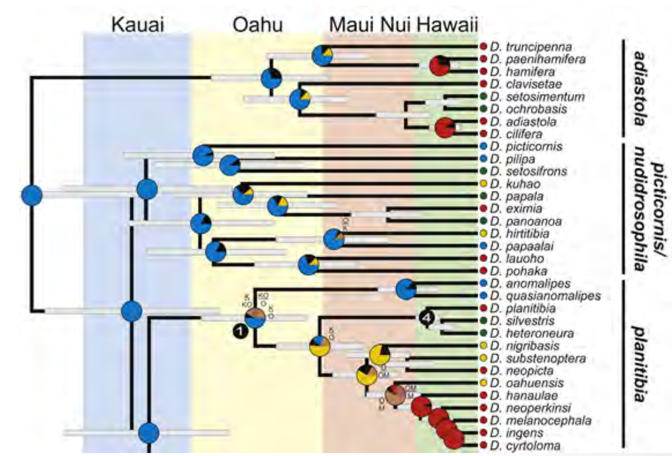
Hawaiian picture wing *Drosophila*



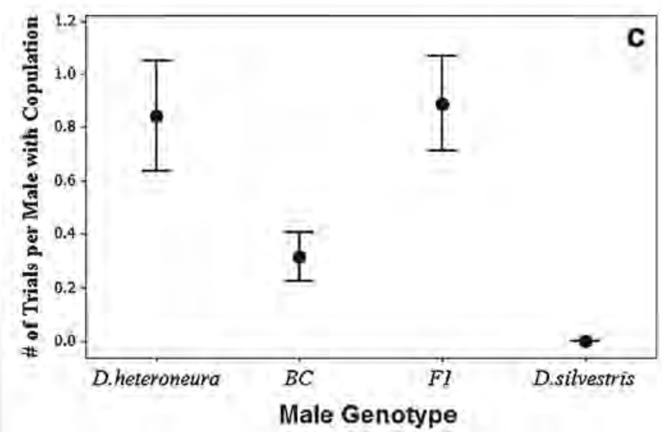
Behavioral Gene Expression Correlation Networks



Hawaiian picture wing Phylogenetic Analysis



Behavioral Reproductive Isolation



Extremophiles

Dr. James Raymond
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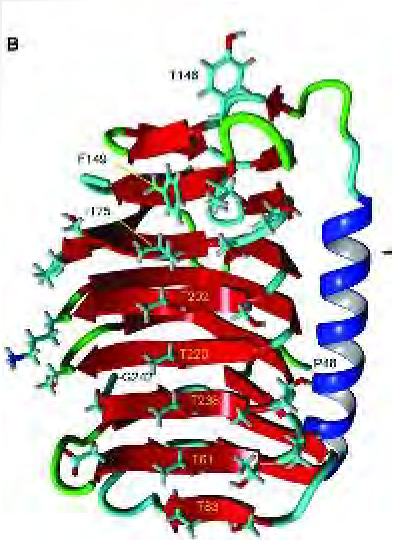
Expertise

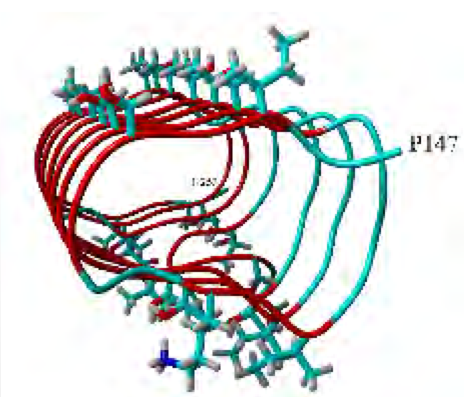
Adaptations to cold environments
Snow algae
Ice-binding proteins
Horizontal gene transfer

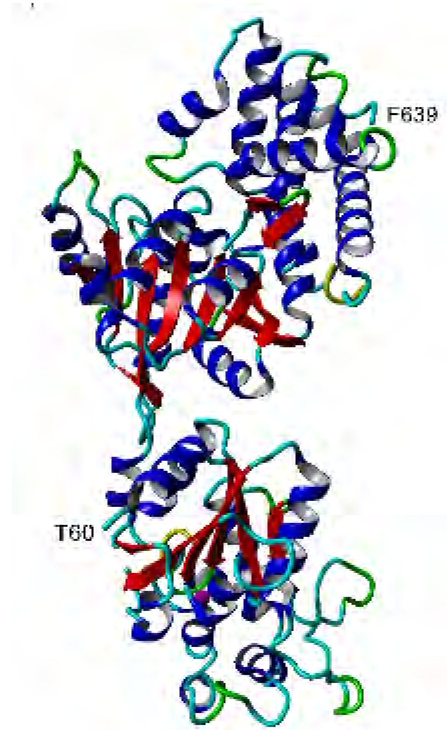
Much of the Earth's surface is exposed to extreme conditions such as freezing, high temperature and hypersalinity.

Organisms living in these regions have developed some remarkable adaptations that not only reveal the beauty of Nature, but also may have commercial applications (e.g., low-calorie ice cream) as well as provide clues to the presence of life in other worlds.

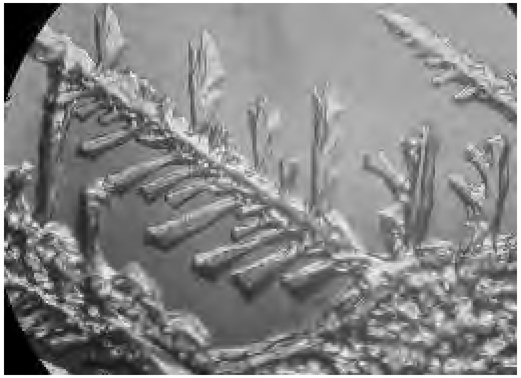


Ice-binding proteins. Above, from a snow alga from the Austrian Alps.[1] Below, from a grass growing on the coast of the Arctic Ocean.[2]





An unusual enzyme found only in a few species of algae. This one is from an alga that lives in a saline lake in Antarctica. The alga uses the enzyme to make glycerol so that it can remain in osmotic equilibrium with the lake water.[3]



Demonstration of how many proteins produced by microorganisms affect the growth of ice by binding to its surface. Here, proteins from a polar cyanobacterium distort the growth of a growing ice crystal.

References
1. Raymond and Remias (2019)
2. Sformo and Raymond (2020) (Submitted)
3. Raymond, Morgan-Kiss and Stahl (2020) (Submitted)

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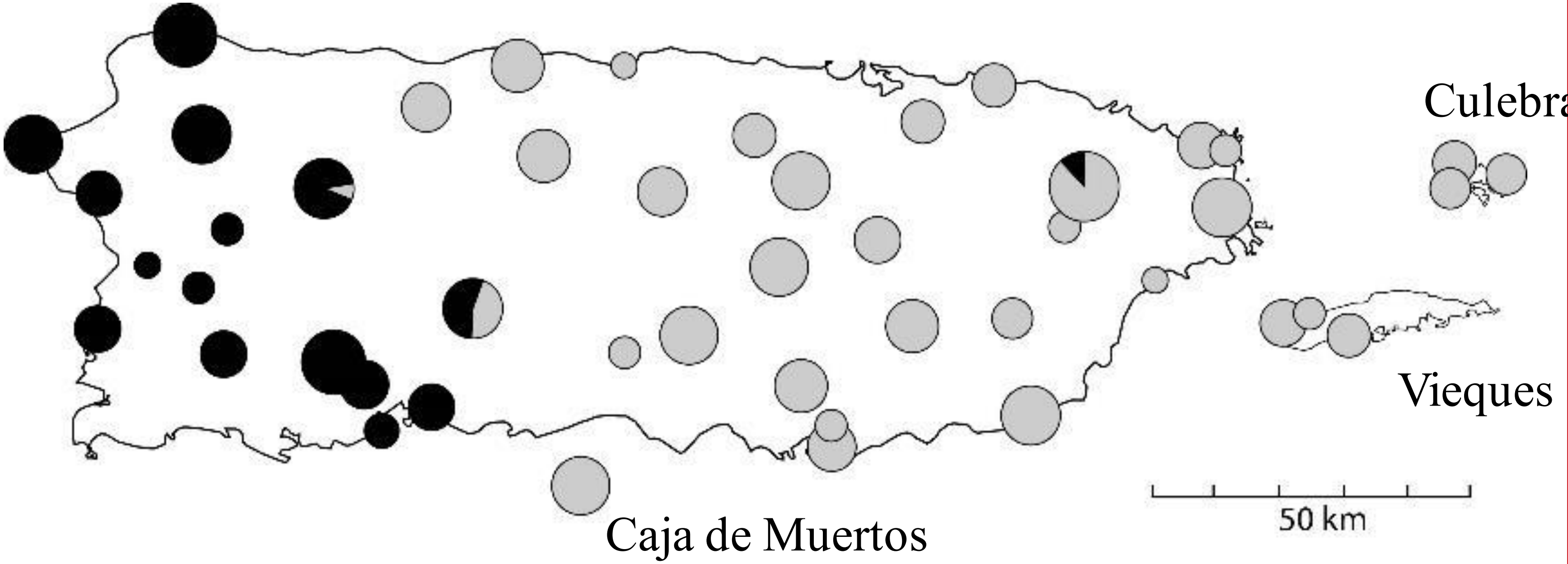
Evolutionary Biology

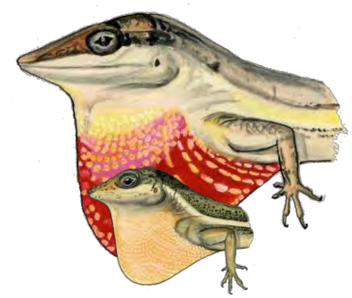
- **Dr. Javier A. Rodríguez**
- Professor of Biological Sciences
- School of Life Sciences
- Email: javier.rodriguez@unlv.edu
- Website: https://jrodriguez.faculty.unlv.edu/

Expertise

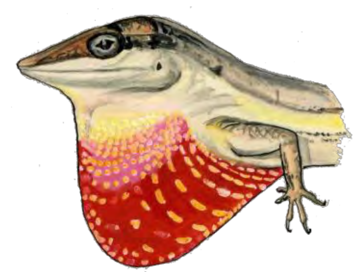
- Evolutionary Biology
- Feeding Ecology
- Genetic Divergence
- Biology of Amphibians and Reptiles

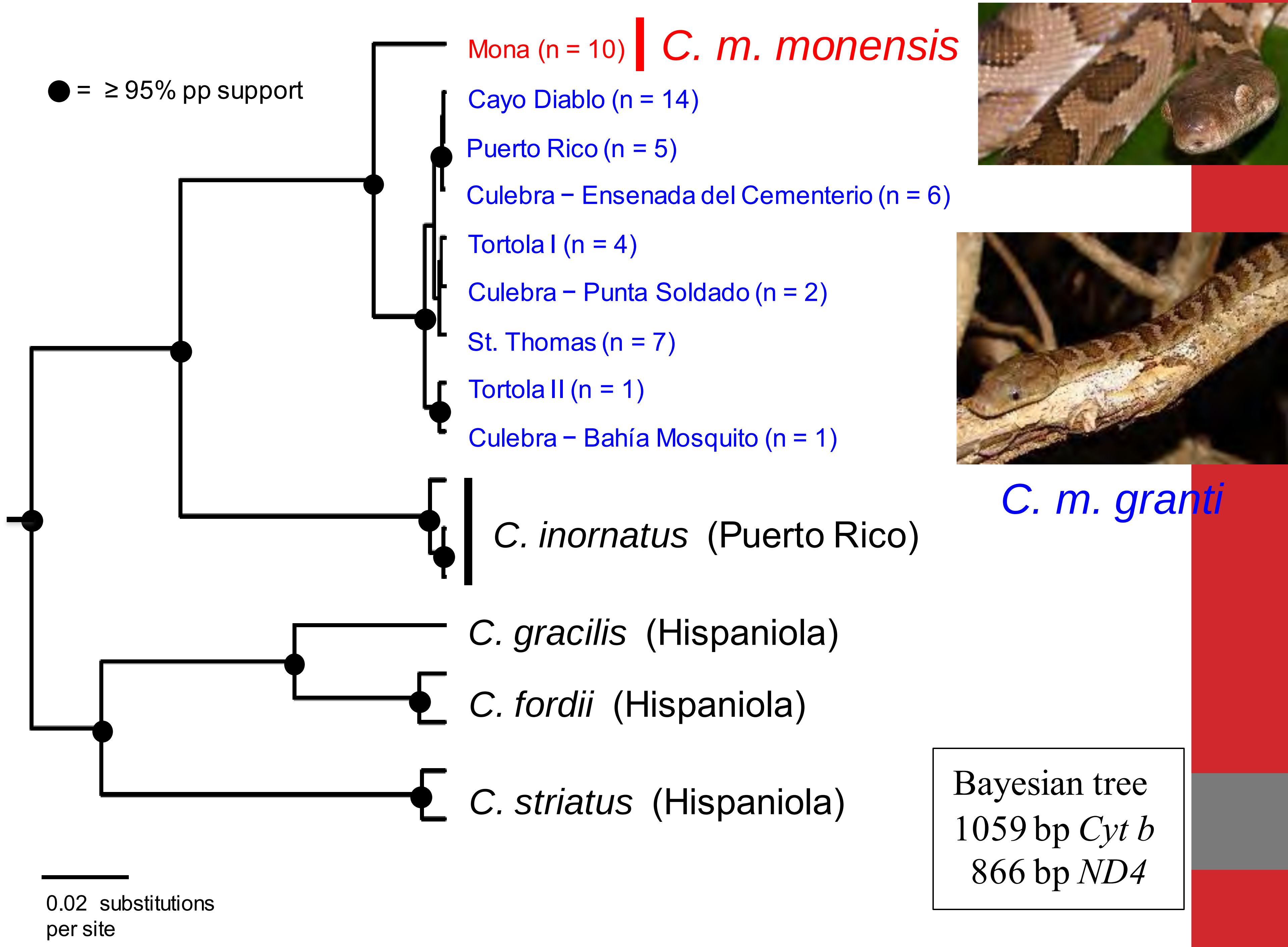


- Hybrids – *A. pulchellus* with *krugi* mtDNA, 85 individuals, 15 localities



- *A. pulchellus* with native mtDNA, 224 individuals, 39 localities




= ≥ 95% pp support
Mona (n = 10)
C. m. monensis
Cayo Diablo (n = 14)
Puerto Rico (n = 5)
Culebra − Ensenada del Cementerio (n = 6)
Tortola I (n = 4)
Culebra − Punta Soldado (n = 2)
St. Thomas (n = 7)
Tortola II (n = 1)
Culebra − Bahía Mosquito (n = 1)
C. m. granti
C. inornatus (Puerto Rico)
C. gracilis (Hispaniola)
C. fordii (Hispaniola)
C. striatus (Hispaniola)
0.02 substitutions per site
Bayesian tree
1059 bp Cyt b
866 bp ND4

Computational biology and the physiology of plants

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School of Life Sciences
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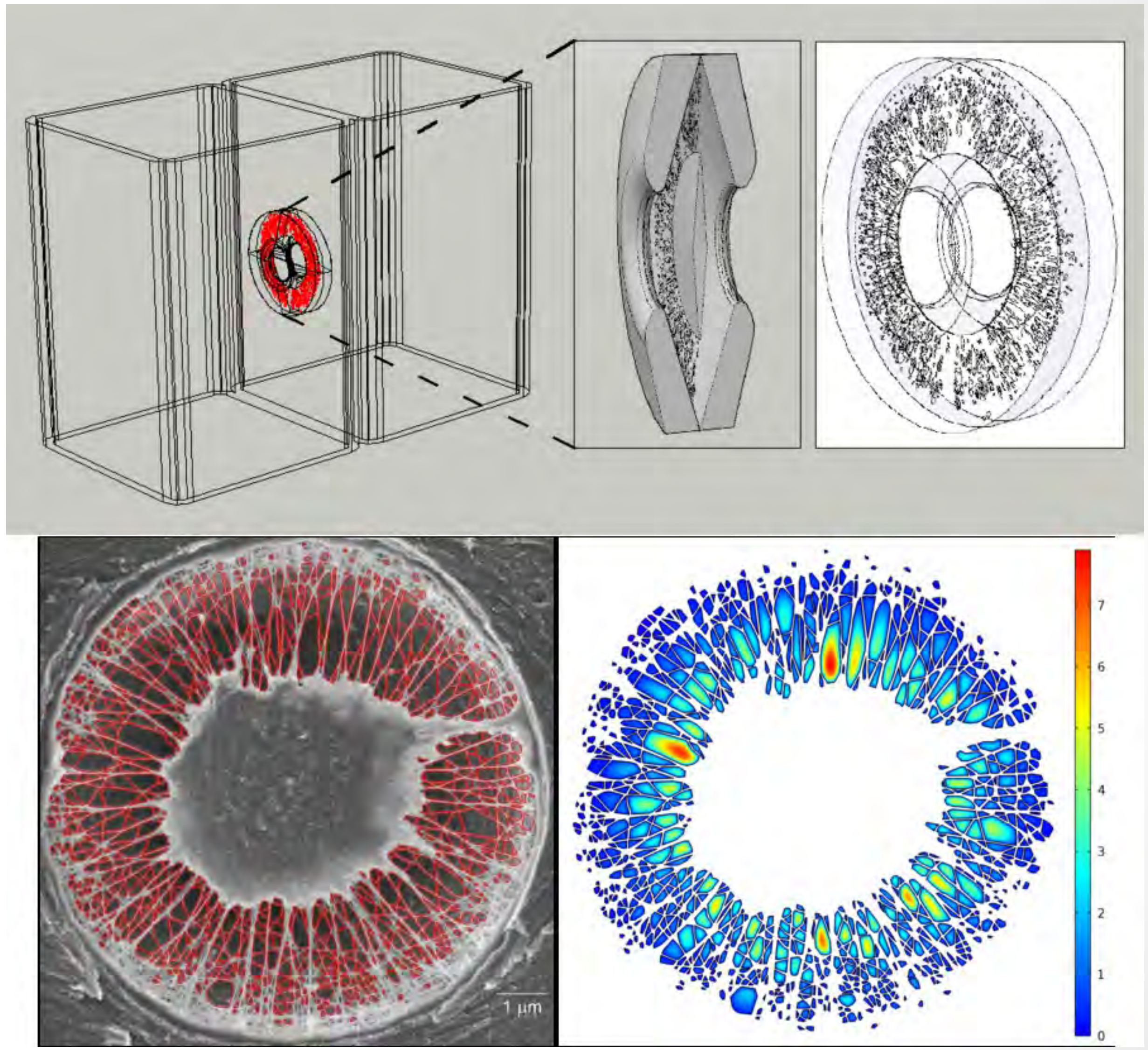
Expertise

- Plant water relations and transport processes
- Computational fluid dynamics
- Anatomy of transport tissues in plants

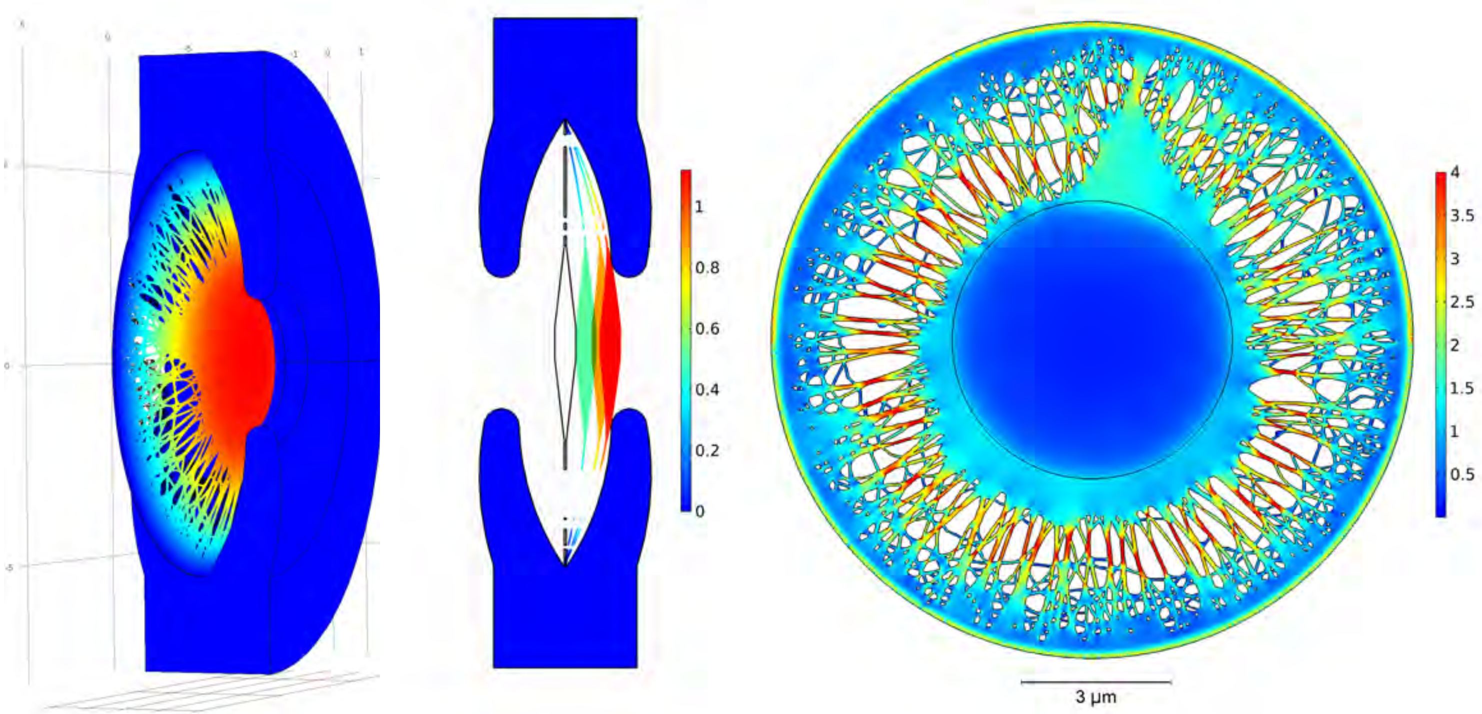
Fluid dynamics of flow between cells

Computer models and mathematical approaches to studying transport processes can help us understand the roles that these structures play in the flow of water from roots to the leaves of tall trees.

These images show work based on a computational fluid dynamics approach to flow through pits in conifer tracheids.



Biomechanics of valves in plant cells



Water flows along the xylem in conifer trees from cell-to-cell through small openings called pits. The pits in many species contain structures that appear to act as valves that prevent air from spreading and blocking the transport system. The above figures show results from solid mechanics modeling of the pressures that are required to deflect the valve and seal the pit.

Dr. Jeffery Shen
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Expertise

- Big Data Analysis to Study Biology, Agriculture and Medicine
- Molecular Mechanisms Controlling Plant Responses to Drought Heat, and Salinity
- Seed Germination, Tissue Culture and Plant Transformation
- Molecular Basis of Leukemia (in collaboration with Dr. J. Cheng at the University of Chicago Medical School)
- Nutrition of Cereal Crops (in collaboration with Dr. Christine Bergman, Ph.D. and R.D. at UNLV)

Molecular Basis of Drought Stress Responses and Seed Germination

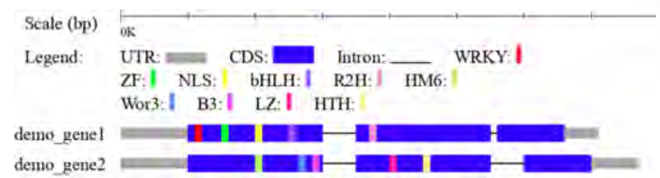
BMC Genomics, 2016, 17:102
Plant Science, 2015, 236:214-222
Front. Plant Science,2015; 6: 1145
Trends in Plant Sci, 2010, 15: 247

Short Read Assembly Algorithm

for Genome and Transcriptome Analysis

http://shenlab.sols.unlv.edu/shenlab/software/Tiling_Assembly/tiling_assembly.html

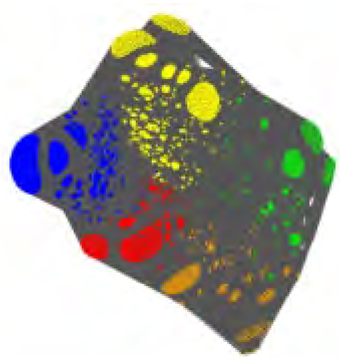
DNA Research, 2015, 22: 319-329
Genomics, 2014, 103:122-134



Promoter and Coding Region Structures

http://shenlab.sols.unlv.edu/shenlab/software/TSD/transcript_display.html

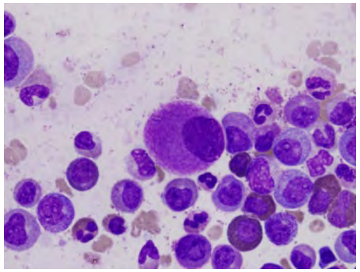
Bioinformatics, 2016, 32:2024-2025
Plant Cell Environ. 2017, 40:2004-2016



Signaling network Analysis

Molecular Basis of Leukemia

(in collaboration with Medical School, University of Chicago)



Cytogenetically normal refractory cytopenia with multilineage dysplasia (CN-RCMD)

Nature Communications, 2018, 9:1163
Leukemia, 2013, 27: 1291-1300

Speciation in Trees

Dr. Elizabeth A. Stacy
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Expertise

- **Local Adaptation & Population Divergence**
- **Evolution of Reproductive Isolating Barriers**
- **Phylogeography & Phylogenomics**
- **Population Genomics**
- **Hawaiian Evolutionary Biology**

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Study system: Hawaiian *Metrosideros*

2.5-to-3.9-million-year-old incipient adaptive radiation of woody taxa that dominates Hawaiian forests





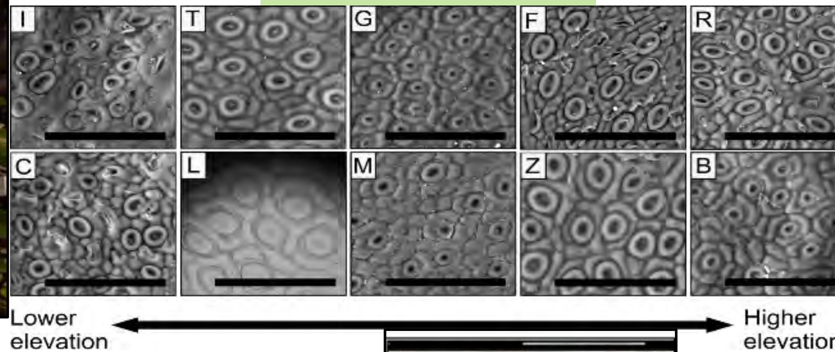




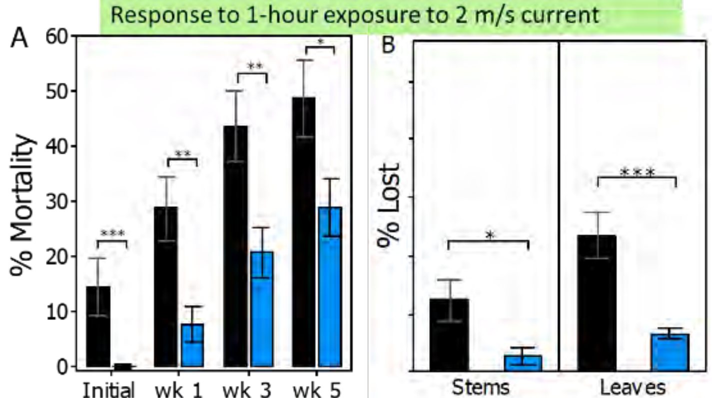
Adam Williams

Local Adaptation & Population Divergence

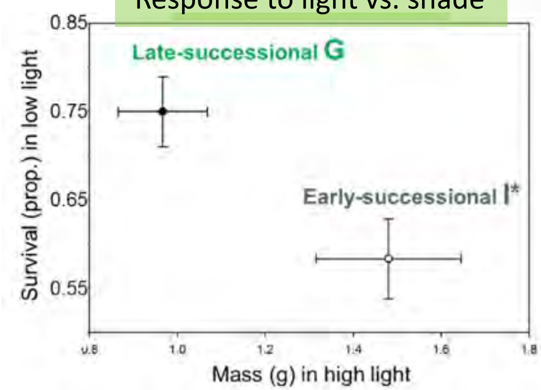
Leaf micromorphology



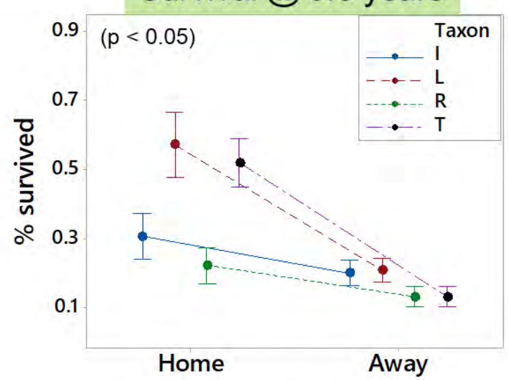
Response to 1-hour exposure to 2 m/s current



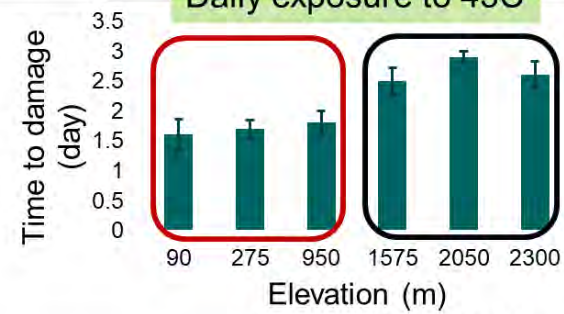
Response to light vs. shade



Survival @ 3.5 years



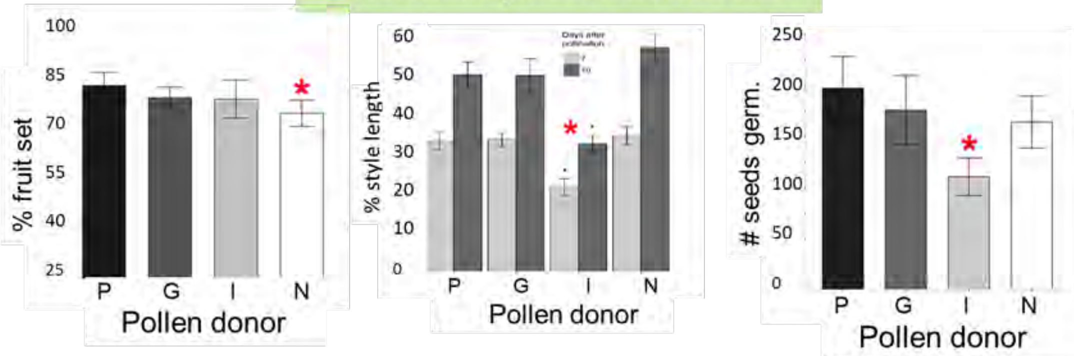
Daily exposure to 43C



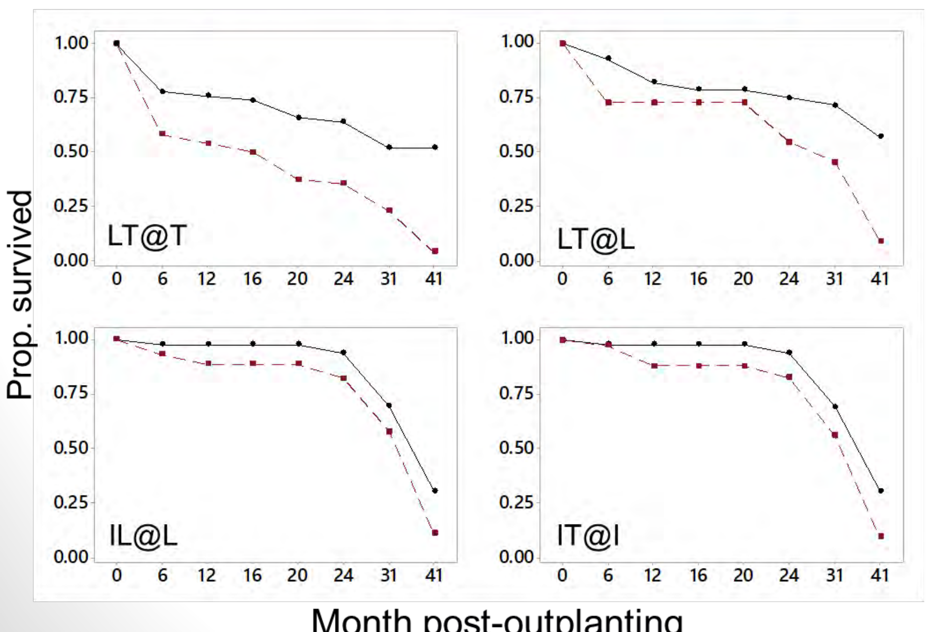
W=330, p=0.03

Evolution of Reproductive Isolating Barriers

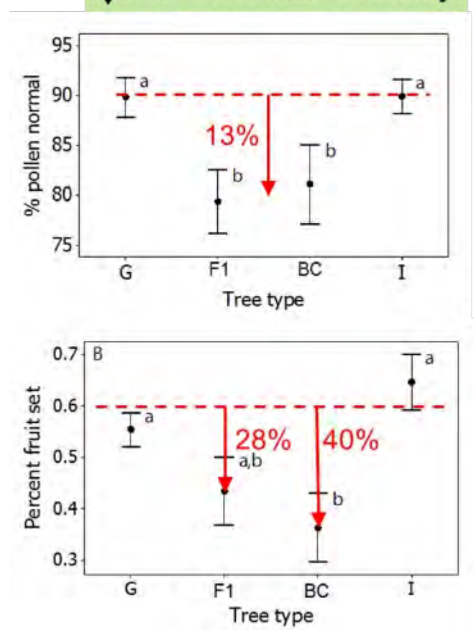
Cross-fertility between varieties



F1 inviability in maternal environment

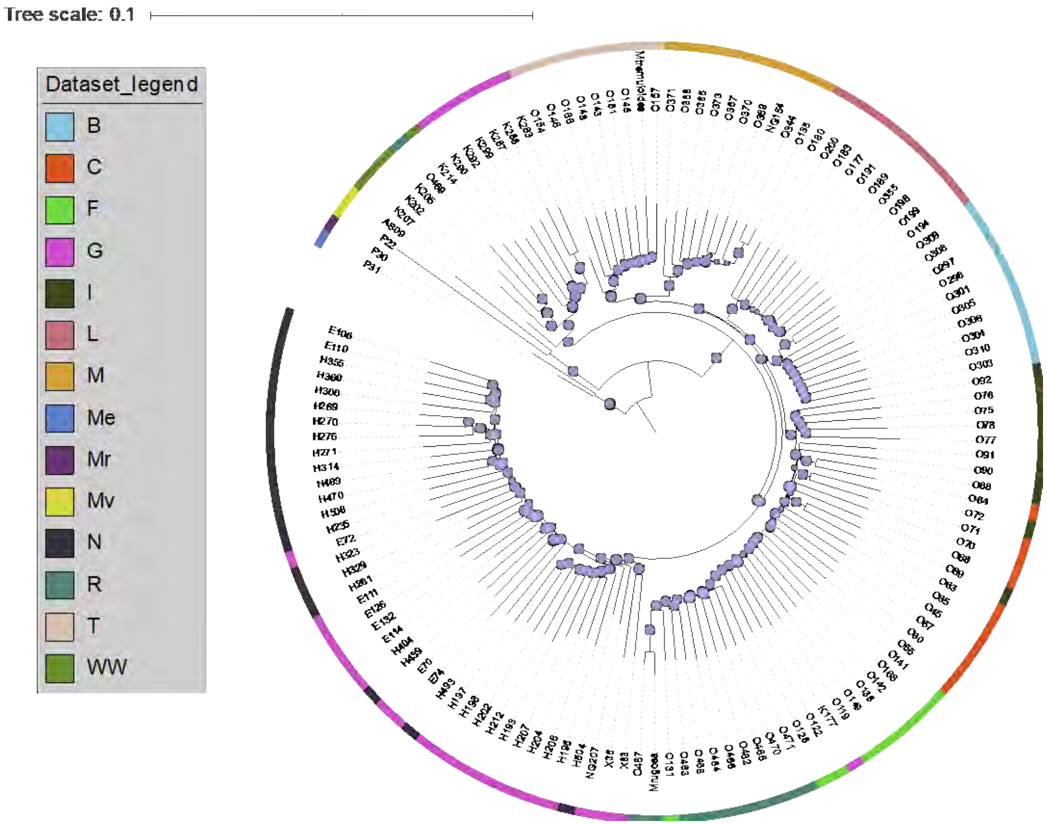


↓ F1 & backcross fertility

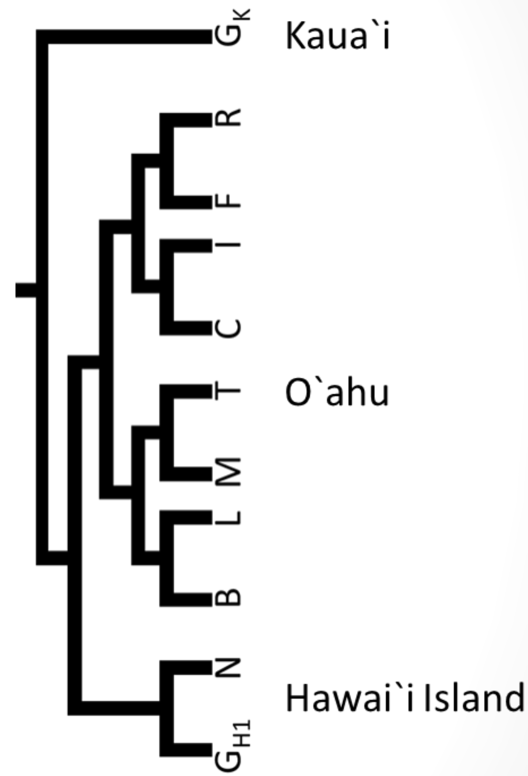


Phylogeography & Phylogenomics

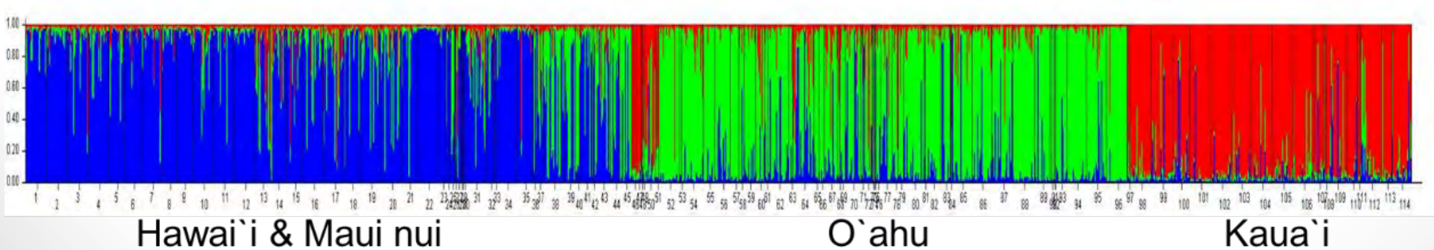
Phylogenomic analysis of 14 taxa (8.5 million genome-wide SNPs)



Phylogenetic analysis of 11 taxa (8.5 million genome-wide SNPs)

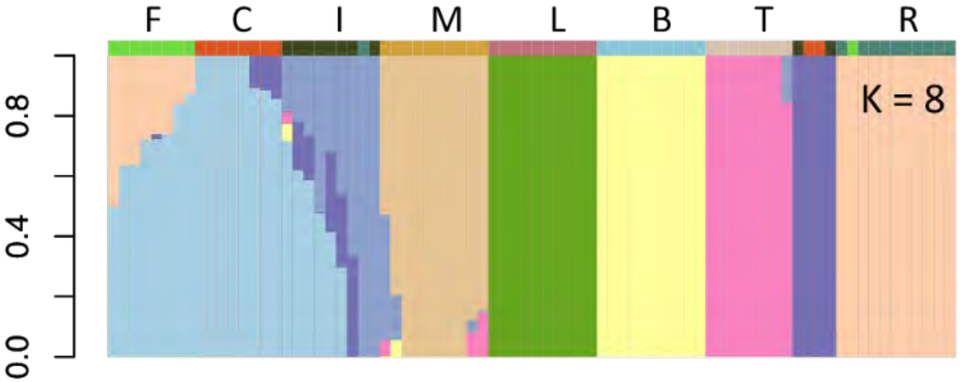


STRUCTURE analysis of 35 populations (9 nuclear SSR loci)

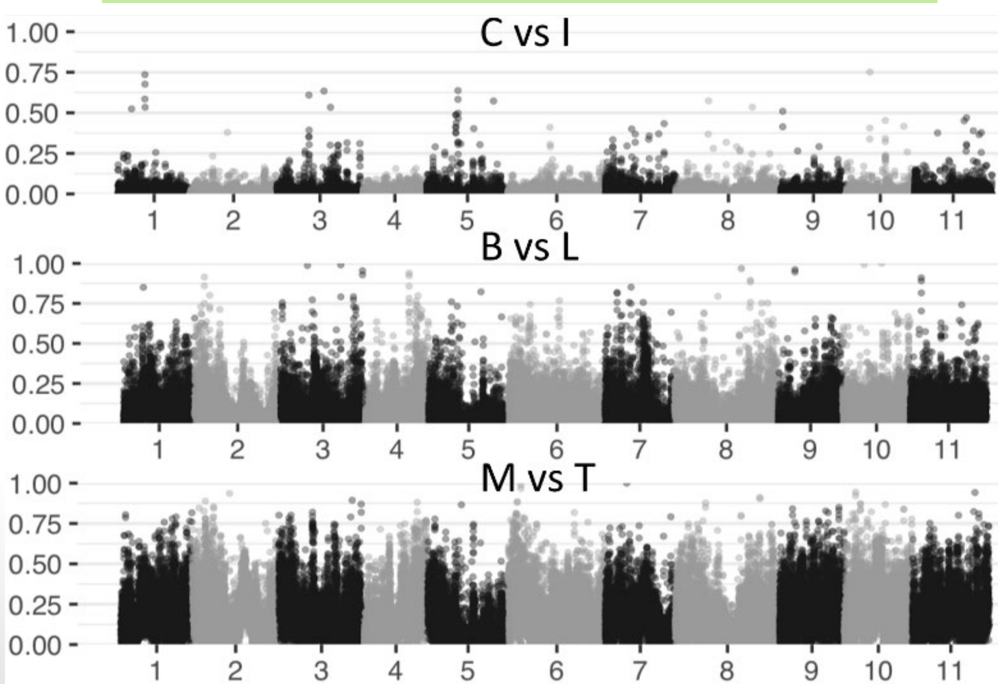


Population Genomics

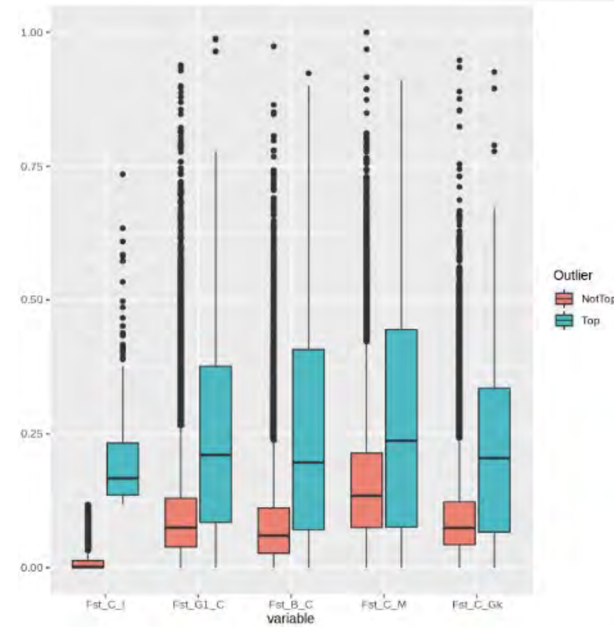
STRUCTURE analysis (8.5 million SNPs)



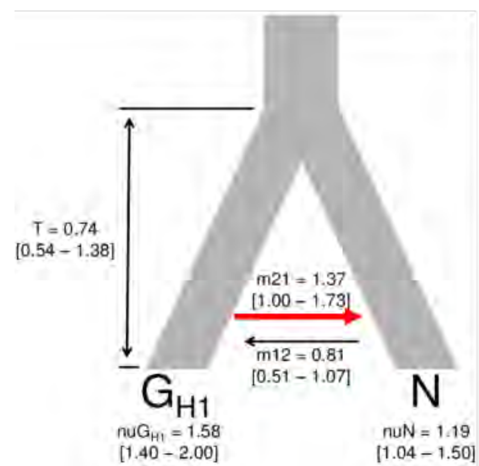
FST analysis to detect genomic islands of divergence



Selection analysis



Divergence time estimation



Aridland Population Biology and Evolution

Dr. Daniel Thompson
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Expertise

- Evolutionary genetics
- Population and evolutionary ecology
- Insect – plant interactions
- Conservation ecology - endemic insects
- Quantitative genetics, Phenotypic plasticity, and Developmental Reaction Norms
- Multivariate Statistical Analysis
- Animal movement, Habitat Selection, and Spatial ecology

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Research on Larval Host Plant Selection of the Endangered Endemic Mt Charleston Blue Butterfly (*Icaricia shasta charlestonensis*) Informs Habitat Conservation and Restoration in Spring Mountains National Recreation Area

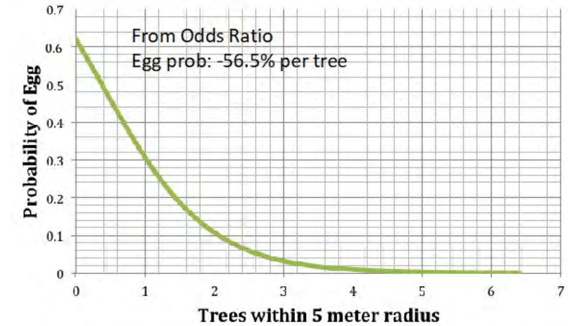
- Tree Density has a strong negative effect on female butterfly host plant selection and egg-laying (Logistic regression of egg occurrence versus density of bristlecone .pines).

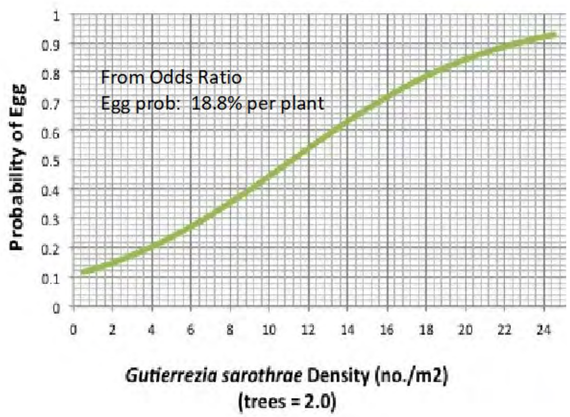
- Tree encroachment on open slopes and ridges constricts butterfly reproduction– particularly on ridgelines with high quality butterfly habitat.

- Nectar plants such as *Gutierrezia sarothrae* have a positive effect on the likelihood of a female's selection of a larval host plant for egg deposition.

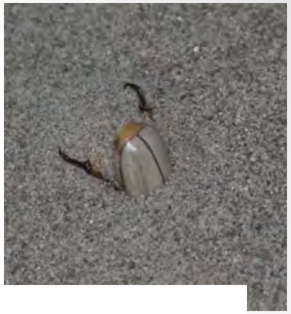
  - Avoidance of trees and attraction to nectar determine a female butterfly's placement of eggs on larval host plants.

  - Ongoing fieldwork investigates caterpillar (larva) growth, foodplant requirements, and interactions with mutualistic ants to further understand the essential characteristics of butterfly habitat. This new information is being used by the US Forest Service and the US Fish and Wildlife Service to guide conservation and management decisions in the Spring Mountains, Clark County, Nevada.





Ecological research on Giuliani's Dune Scarab Beetle (*Pseudocotalpa giulianii),* Big Dune, Nevada, --guiding management decisions of the B.L.M.



Giuliani's Dune Scarab Beetle (*Pseudocotalpa giulianii*) is a rare beetle endemic (known to occur only at) Big Dune and Lava Dune, Nye County, Nevada. Little is known about the beetle's life history, egg to adult stage development, larval food, and habitat requirements. Research conducted with Dr. Leslie DeFalco (USGS) in 2019 and 2020 has established:

- Adults do not feed, dwell in the sand, and emerge at sundown each evening for 3 weeks, late April – May

- Male beetles emerge from sand and fly every night for an average of 52.2 min to mate, while female beetles remain buried in sand after initial emergence and mating.

- Female beetles, on average, deposit one egg per day after mating.

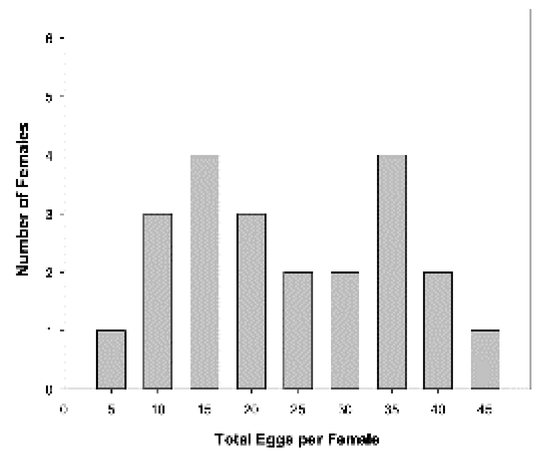
- Female beetles have an average lifespan of 47.7 + 1.6 days.

- Male beetles have an average lifespan of only 20.2 + .7 days.

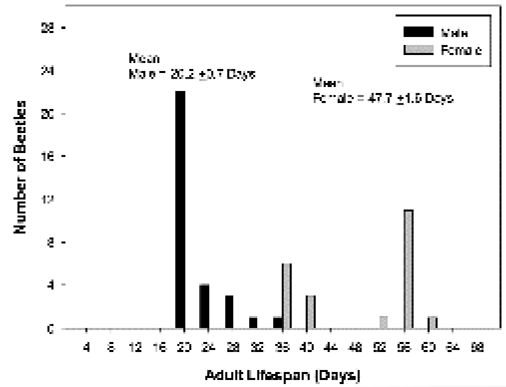
- The longer female lifespan, their apparent cessation of emergence following mating, and their deposition of single eggs scattered through sand has important implications for the conservation of this rare species.

- Laboratory experiments have revealed that beetle larvae hatch within 2 – 3 weeks from eggs and develop at a slow rate with an estimated 2 to 3 years of growth prior to pupation and adult emergence. To date, feeding experiments indicate that dry plant debris scattered in the sand is an essential food source. Further experiments are being conducted to determine whether larvae feed on roots of desert plants and to measure energy storage in fat tissue that apparently fuels adult activity and mating.

- Research findings are informing Bureau of Land Management (BLM) decisions about managing recreational activity at Big Dune and restoring beetle habitat following disturbance by recreational off-road vehicles..



Total eggs per female beetle obtained in the laboratory, April 29 to June 12



Average lifespan for 30 male beetles and 22 female beetles, observed from April 19 to June 12 in the laboratory

Regeneration and Stem Cell Biology

Ai-Sun (Kelly) Tseng, Ph.D.

Associate Professor, School of Life Sciences

Adjunct Associate Professor, School of Medicine

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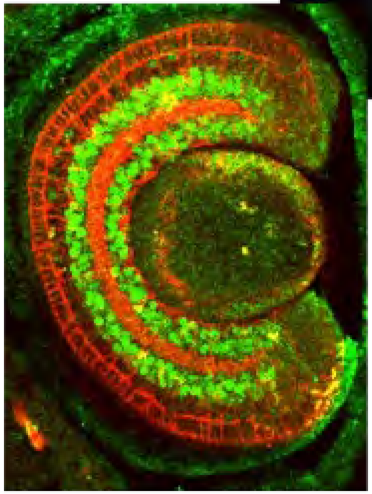
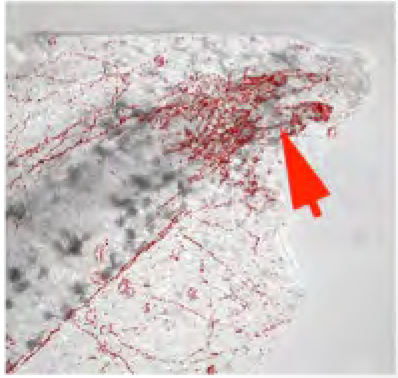
Email: kelly.tseng@unlv.edu

Website: http://tseng.faculty.unlv.edu





Expertise

- Eye regeneration
- Limb regeneration
- Stem cell biology
- Bioelectrical signaling
- Cell proliferation and growth

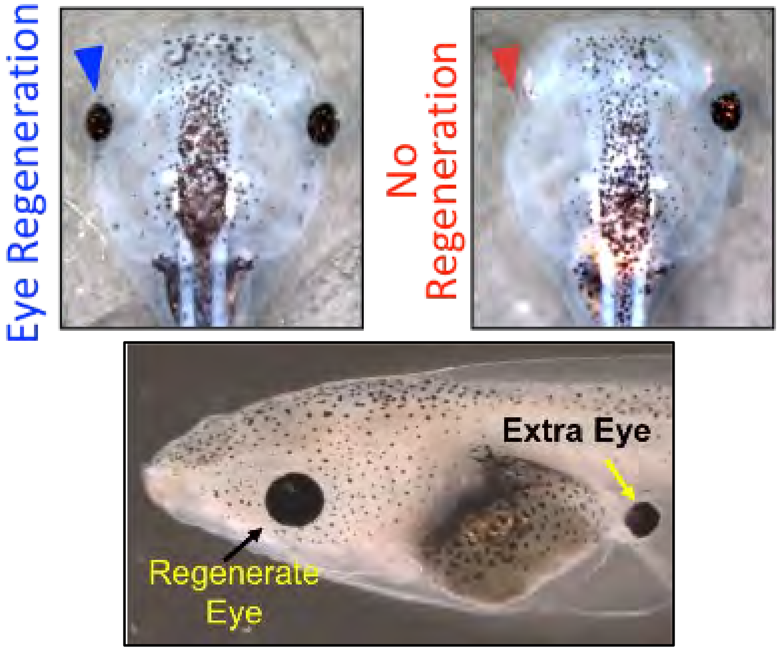
Understanding Vertebrate Organ Regeneration

Kelly Tseng

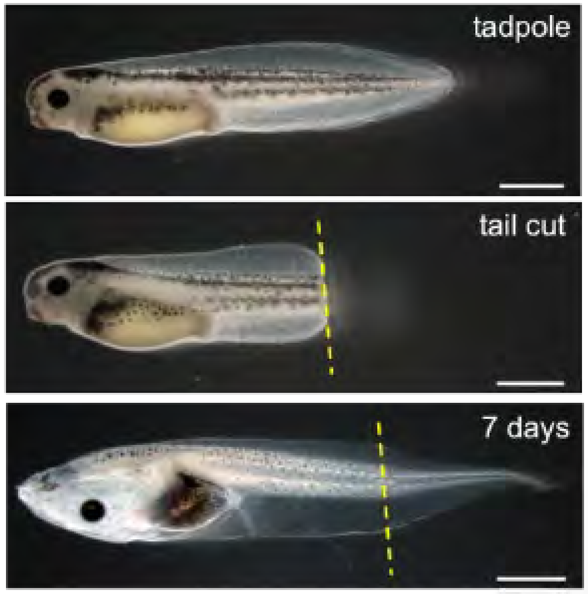
Why Can Some Animals Regenerate Body Parts but Others Cannot?

Goal: understand natural regeneration using a model system with high regenerative ability (clawed frog)

Eye Regeneration



Spinal Cord Regeneration



Projects:

1) Identify and define mechanisms that drive tissue regeneration
2) Develop successful strategies to regenerate lost tissues and organs

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Understanding Vertebrate Organ Regeneration

Kelly Tseng

Recent Publications:

- Kha, C. X., Guerin, D.J., and Tseng, K. A.-S. (2020) Studying *in vivo* Retinal Progenitor Cell Proliferation in *Xenopus laevis*. In: Mao CA. (ed) *Retinal Development. Methods in Molecular Biology, 2092:19-33*. Humana, New York, NY.
- Kha, C. X, Guerin, D.J., and Tseng, K. A.-S. (2019) Using the *Xenopus* Developmental Eye Regrowth System to Distinguish the Role of Developmental Versus Regenerative Mechanisms. *Frontiers in Physiology*, May 8;10:502. doi: 10.3389/fphys.2019.00502.
- Kha, C. X., and Tseng, K. A.-S. (2018) Developmental Dependence for Functional Eye Regrowth in *Xenopus laevis. Neural Regeneration Research, 13*:1735-38.
- Kha, C. X., Son, P. H. , Lauper, J., and Tseng, K. A.-S. (2018) A Model to Investigate Developmental Eye Repair in *Xenopus laevis. Experimental Eye Research, 169*:38-47.
- Tseng, A.-S. (2017). Seeing the future: using *Xenopus* to understand eye regeneration. *genesis: The Journal of Genetics and Development, 55*(1-2), e23003. http://dx.doi.org/10.1002/dvg.23003

http://tseng.faculty.unlv.edu

Bacterial Physiology Research

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School of Life Sciences
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Email: boo.tseng@unlv.edu

Expertise:

- *Pseudomonas aeruginosa*
- Biofilms
- Bacterial stress response
- Antimicrobial susceptibility
- Cystic fibrosis lung infections

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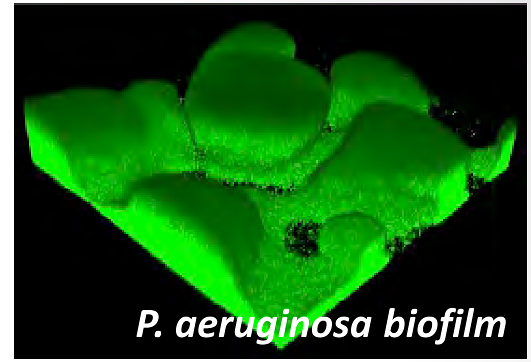
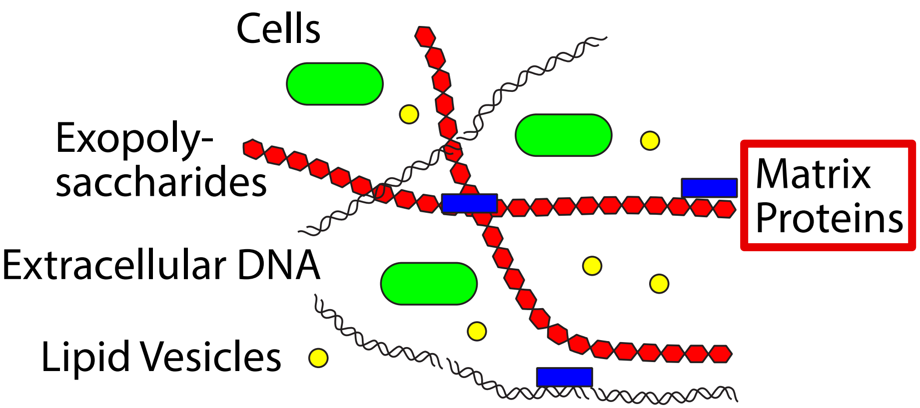
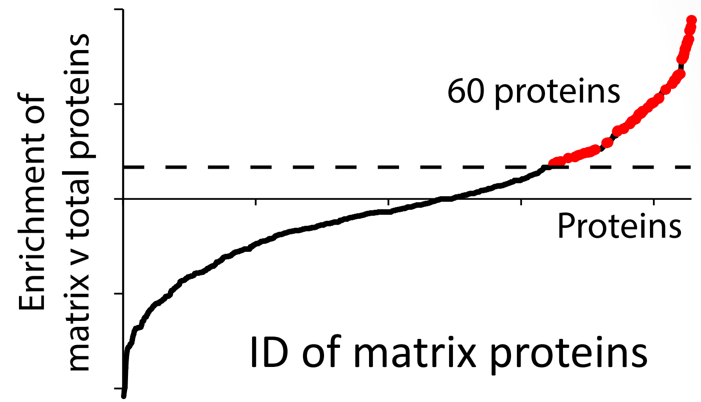
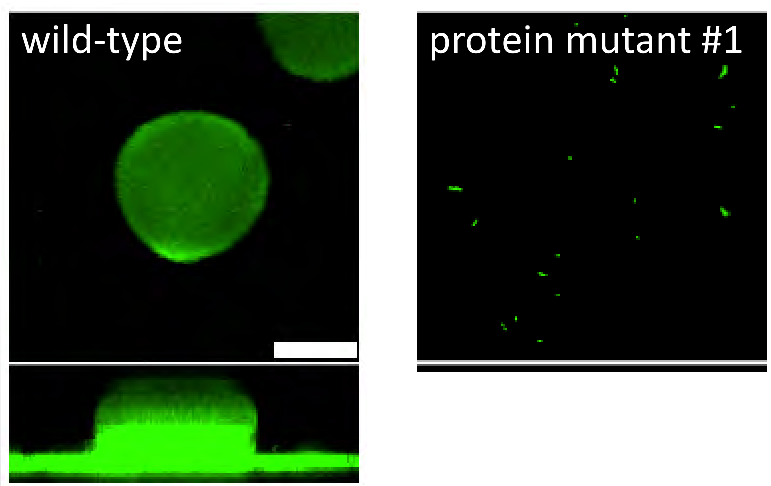
Identifying the roles of biofilm matrix components



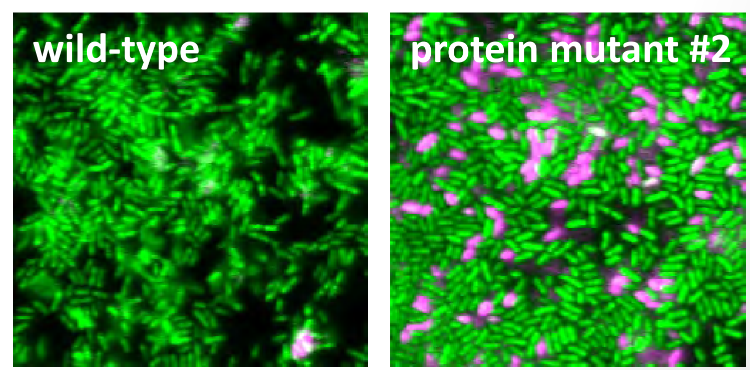




Functions in biofilm formation

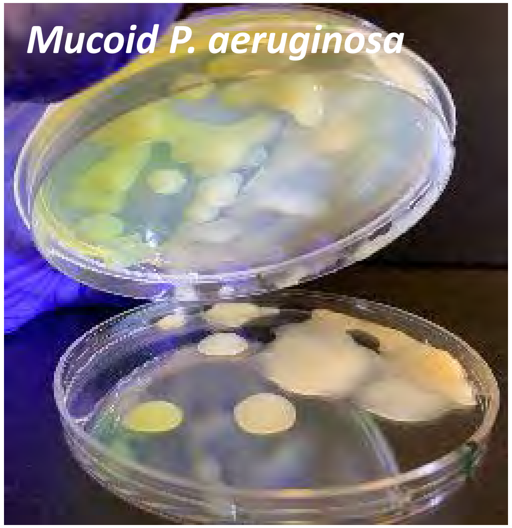


Functions in antimicrobial susceptibility

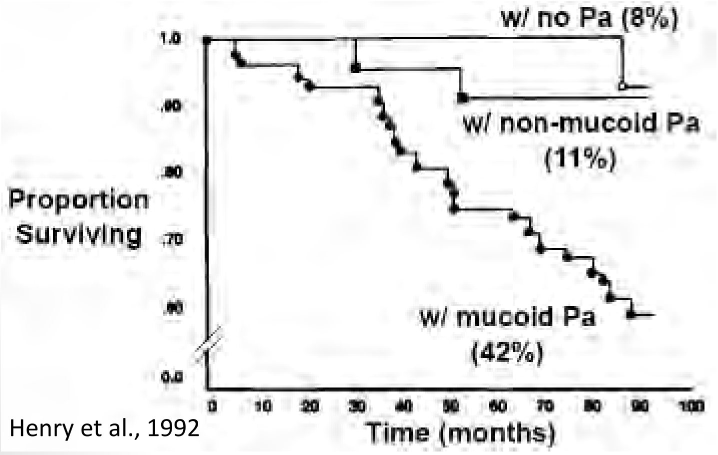


Treated with elastase (green: alive; purple: dead)

Mechanism behind the essentiality of bacterial envelope stress inhibitor

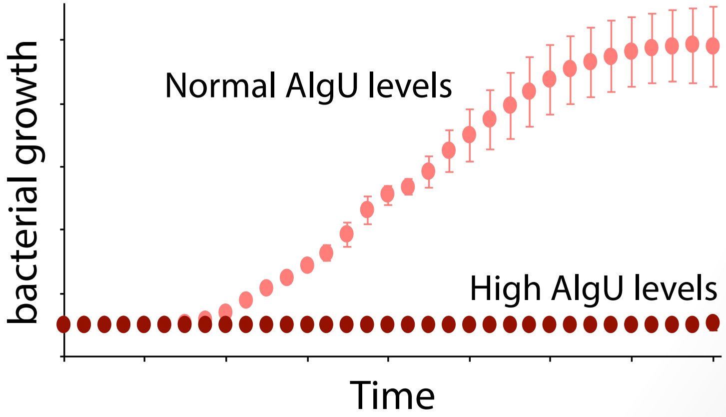


- Exopolysaccharide overproducing (e.g. mucoid) bacteria arise during chronic lung infection
- Associated with poor disease outcomes
- Due to mutation in *mucA* gene, which encodes for inhibitor of envelope stress response via AlgU
- BUT *mucA* required for bacterial viability and overproduction of AlgU inhibits growth



Henry et al., 1992

In children with cystic fibrosis



Question: why is a gene commonly mutated in clinical isolates required for bacterial viability?

STEM Education Research

Dr. Jenifer C. Utz

Associate Professor in Residence

School of Life Sciences

Phone: 702-895-3386

Email: jenifer.utz@unlv.edu

Expertise

- Undergraduate STEM education
- Digital learning resources
- Mammalian hibernation

Facilitating academic achievement for a diverse undergraduate population

- Effects of self-testing:

Voluntary Web-Based Self-Assessment Quiz Use is Associated With Improved Exam Performance, Especially for Learners with Low Prior Knowledge

Jenifer C. Utz, PhD[1] and Matthew L. Bernacki, PhD[2]
[1]School of Life Sciences, College of Sciences, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89154
[2]Learning Analytics Initiative, College of Education, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89154
jenifer.utz@unlv.edu, matt.bernacki@unlv.edu

Abstract
This study examined students' voluntary use of digital self-assessment quizzes as a resource for learning in a large anatomy and physiology lecture course. Students (n = 238) could use 16 chapter quizzes and four analogous unit quizzes to rehearse and self-assess knowledge. Most students (75%) engaged in occasional use of self-assessment quiz items; repeated use was uncommon (12%), as was lack of use (13%). Exam performance differed between quiz use groups. Quiz use improved exam performance more among students who entered the course with low prior knowledge of concepts from the prerequisite course. Cumulatively for all students and all exams, repeated self-assessment quiz users significantly outperformed occasional users (+7.5%) and non-users (+11.9%) on course exams. Incorporation of optional learning resources can enhance the learning success of students.

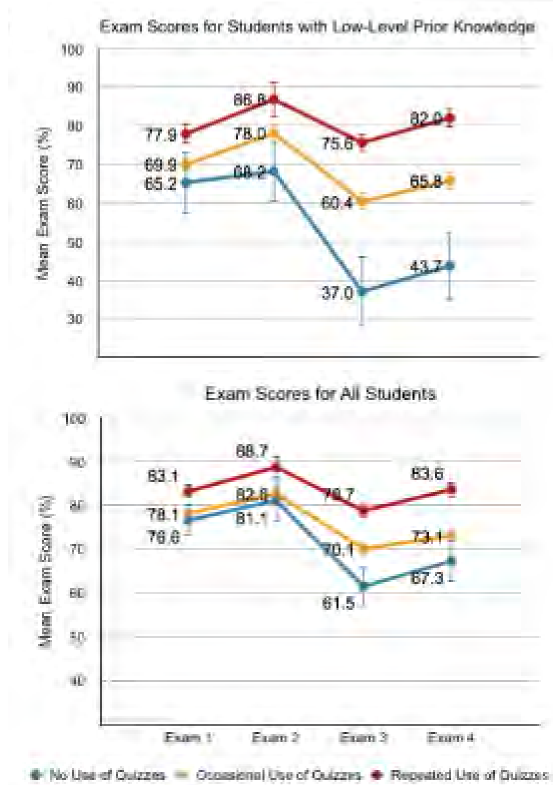


Figure 3. Effect of Self-Assessment Quiz Use on Exam Performance Symbols represent means ± standard error of the mean.

- Effects of skill training:

Journal of Educational Psychology

Can a Brief, Digital Skill Training Intervention Help Undergraduates "Learn to Learn" and Improve Their STEM Achievement?

Matthew L. Bernacki
University of North Carolina, Chapel Hill

Lucie Vosicka and Jenifer C. Utz
University of Nevada, Las Vegas

Students who drop out of their science, technology, engineering, and math (STEM) majors commonly report that they lack skills critical to STEM learning and career pursuits. Many training programs exist to develop students' learning skills but they typically achieve small to medium effects on behaviors and performance. However, these programs require large investments of students' and instructors' time and effort, which limits their applicability to large lecture course formats commonly employed in early undergraduate STEM coursework. This study examined whether brief digital training modules designed to help students apply learning strategies and self-regulated learning principles effectively in their STEM courses can impact students' behaviors and performance in a large biology lecture course. Results indicate that a 2-hr *Science of Learning to Learn* training had significant effects on students' use of

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Developing the Skill and Will to Succeed in STEM Scholarship Program

A primary goal of this scholarship program is to diversify and increase the number of students entering STEM professions

- The School of Life Sciences welcomed the first cohort of 17 Succeed in STEM Scholarship recipients in 2019
- Over $420,000 of scholarship support will be distributed across the lifetime of this 5-year program

Hibernation physiology

- Rewarming from torpor:

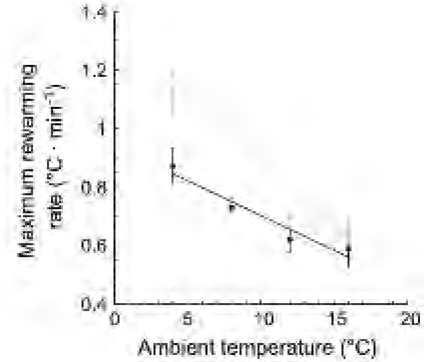


Fig. 3. Effect of ambient temperature on maximum rate of rewarming for natural and prematurely induced arousal from torpor. Symbols represent means ± SE for natural (black) and induced (gray) arousal. $n = 5$. There is a significant effect of T_a on the maximum rate of rewarming for both natural and induced arousals, $p < 0.05$, $r^2 = 0.93$, $r^2 = 0.88$ respectively. There is a significant effect of arousal type on the maximum rate of rewarming, $p < 0.05$.

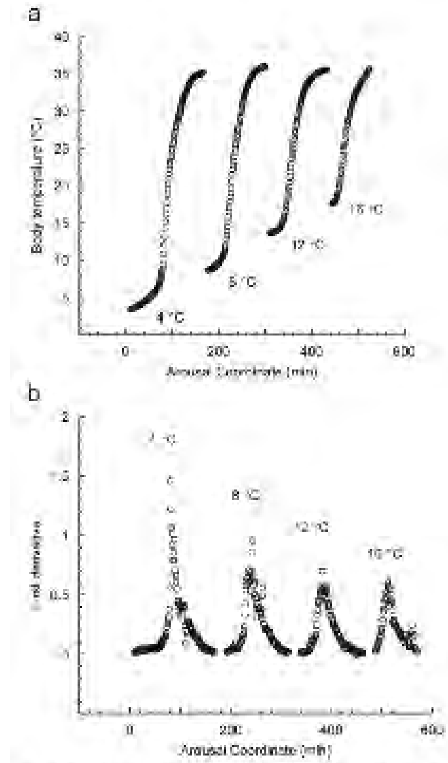
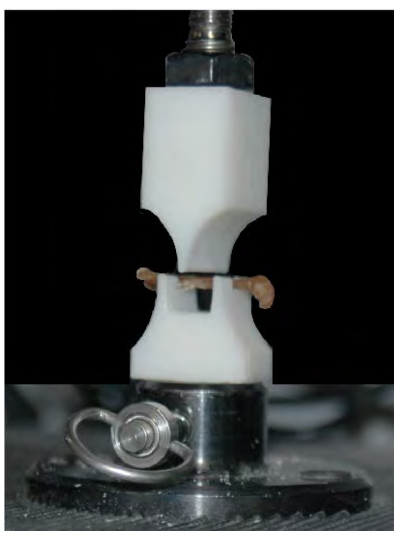
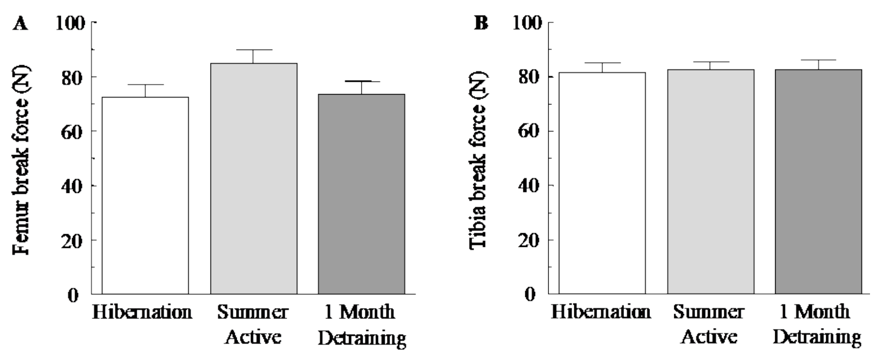


Fig. 2. Body temperature as a function of time during arousals from one individual. (A) Body temperature was measured every minute for a squirrel housed at 4, 8, 12, and 16 °C. (B) Instantaneous rate changes as demonstrated by plotting the first derivative as a function of time across the same range of ambient temperatures.

- Resistance to bone disuse atrophy:





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Understand cancer from an embryonic prospective

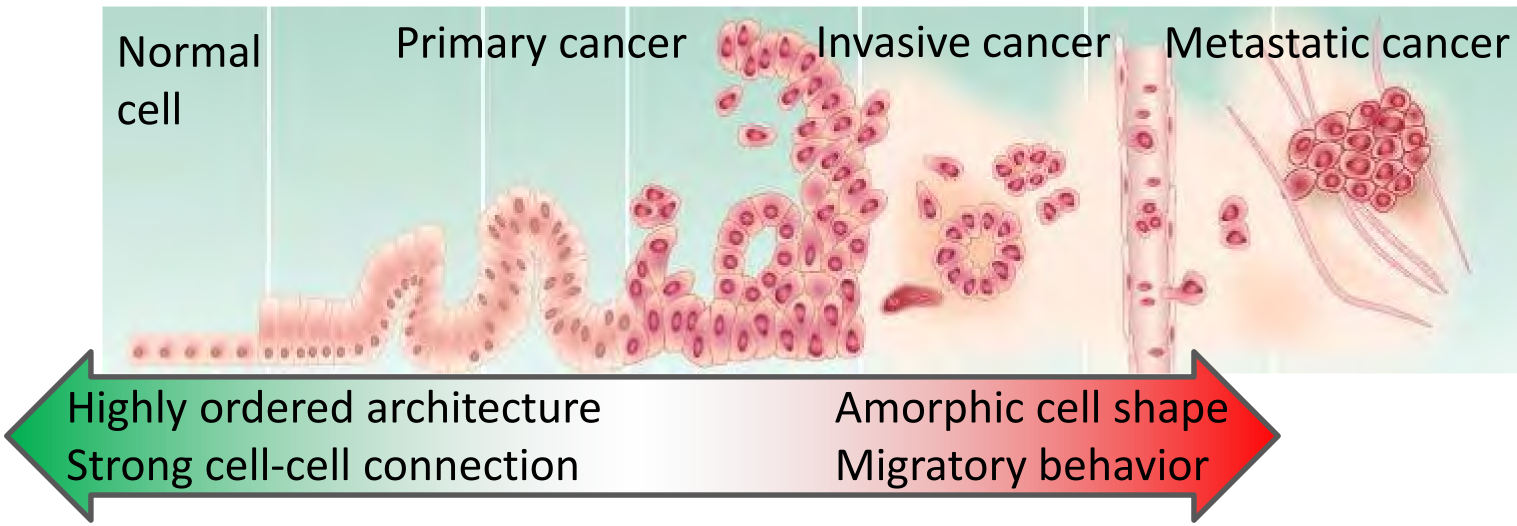
Dr. Mo Weng
Assistant Professor
School of Life Sciences
Phone: 702-895-5704
Email: mo.weng@unlv.edu

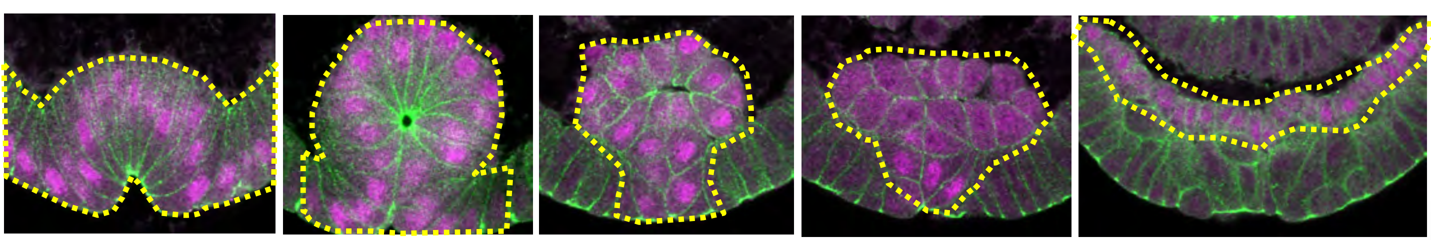
Expertise

- Epithelial-mesenchymal transition
- Developmental genetics
- mechanobiology
- Cancer biology

Understand cancer from an embryonic prospective

- Metastasis, the cause of death for 90% cancer patients, is not a cancer invention but a hijacked natural program essential for generating diverse structures in embryos, called epithelial-mesenchymal transition (EMT).



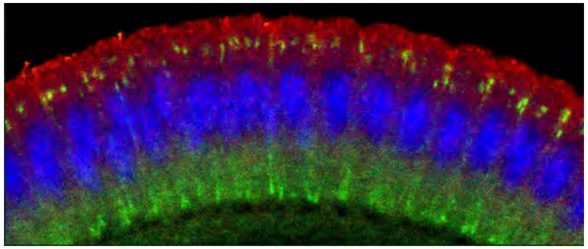


Embryo EMT

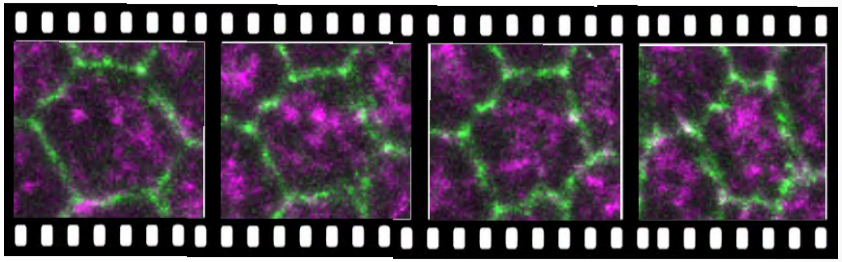
Understand cancer from an embryonic prospective

We use multidisciplinary approaches to study both biochemical and mechanobiological pathways controlling cell polarity and cell fate.

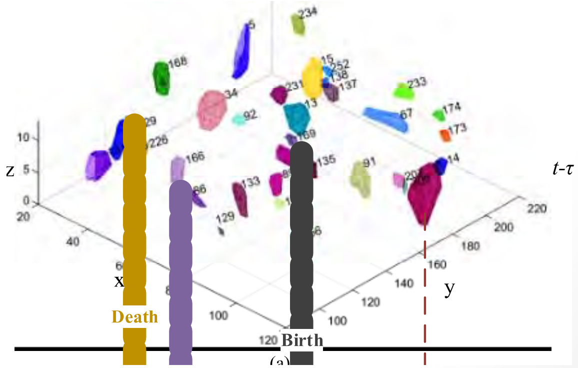
- Seeing is believing: Laser scanning confocal imaging probes micrometer cellular structures in 3D at high resolution and sensitivity



- Live cell imaging records the dynamics of cells and proteins as the living embryo taking on increasingly complex structures.



- Machine-learning approaches extract invisible principles from information-rich images and make predictions



- Genetic approaches such as gene editing test the roles of individual genes and their interaction.

Microbiology

Dr. Helen J. Wing
Professor,

School of Life Sciences
Phone: 702-895-5382
Email: helen.wing@unlv.edu

Expertise

- Microbiology focusing on agents of Infectious Disease
- Bacterial Gene Regulation
- Bacterial Physiology
- Molecular Biology controlling virulence
- Identification of novel drug targets
- Antibiotics use & Antibiotic resistance

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Genetic switches & molecular mechanisms controlling virulence

<u>Central themes of this project</u>

Transcriptional control of bacterial genes

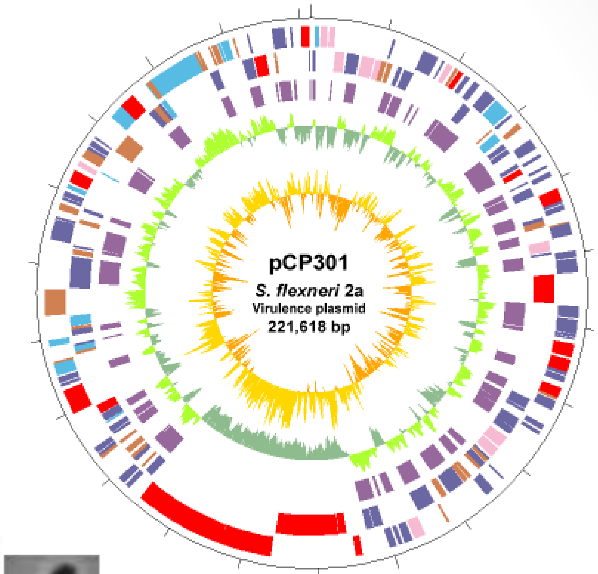
Dynamic nucleoid remodeling

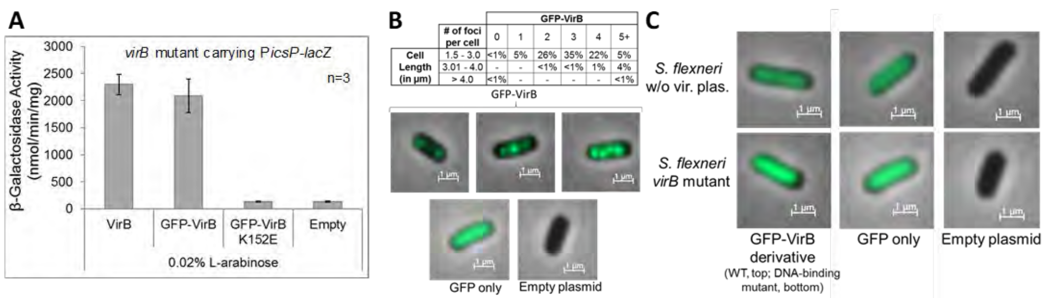
DNA-protein and ligand-protein interactions

Evolutionary relationship of bacterial proteins

Bacterial management of large plasmids

Novel targets for antibiotics and therapeutics





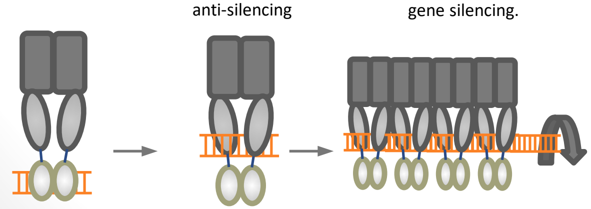
	# of foci per cell	GFP-VirB 0	1	2	3	4	5+
Cell Length (in µm)	1.5 - 3.0	<1%	5%	26%	35%	22%	5%
	3.01 - 4.0	-	-	<1%	<1%	1%	4%
	> 4.0	<1%	-	-	-	-	<1%

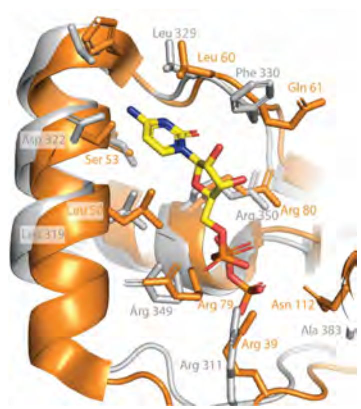
A: Current model

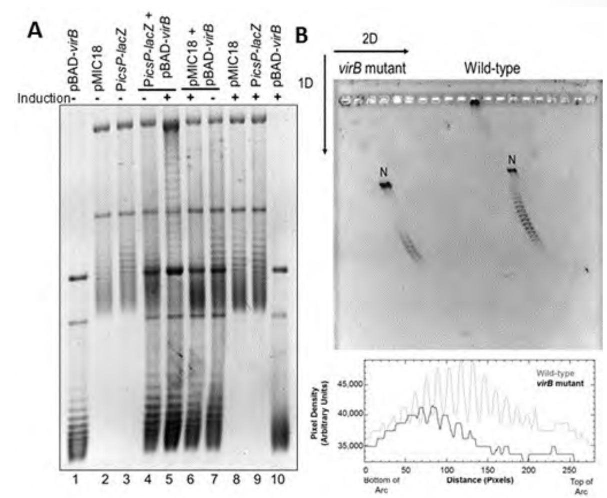
Step 1: Non-specific interactions with DNA (in vitro only)

Step 2: Binding to its recognition site is a prereq. for Δlk, focus formation & anti-silencing

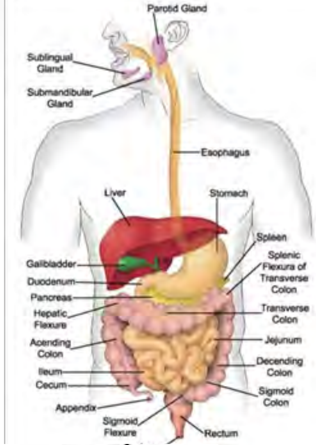
Step 3: Spreading along DNA causing torsion in the DNA helix. The triggered change in DNA supercoiling is sufficient to relieve gene silencing.







Shigella pathogenesis



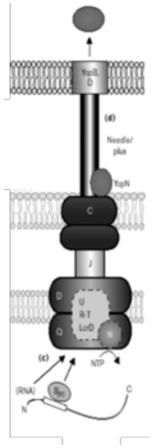
<u>*Fast Facts*</u>

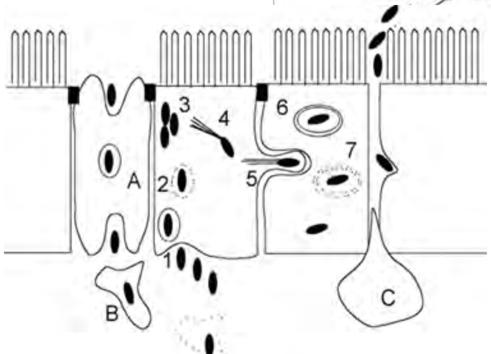
Shigella species - causal agents of bacillary dysentery

Cause an estimated 80-165 million cases per year and 600,000 deaths, mostly in children under 5 years.

Highly infectious (low infectious dose)

Increasingly resistant to commonly used antibiotics

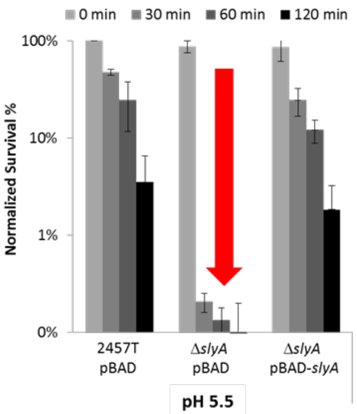




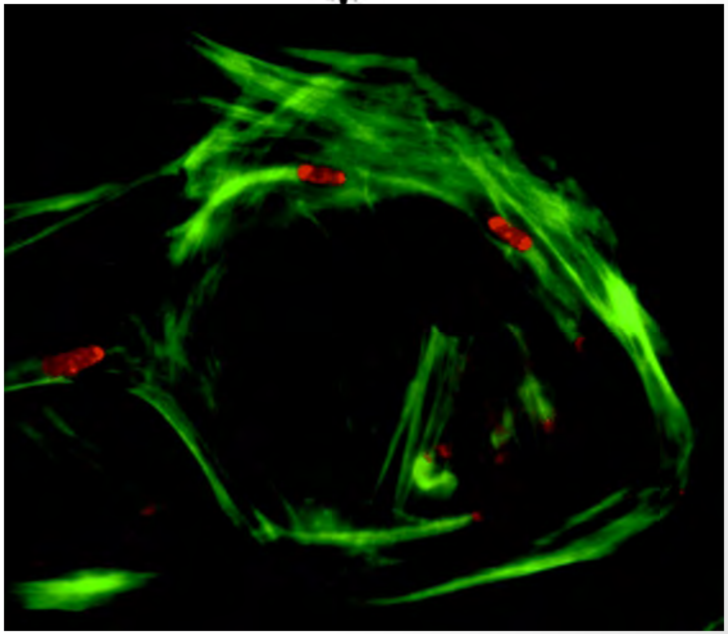
<u>Central themes of this project</u>

Why are these pathogens so infectious?
- we explore their acid resistance (stomach acid)

How do they enter host cells?
- we study regulation of the Type III secretion system (a bacterial conduit that delivers proteins into host cells).



How do these bacteria cause disease in humans?
-one way is to hijack the host's actin cytoskeleton. The bacteria use the actin to move through the host cell cytoplasm!



Through these studies we hope to identify new ways to treat & prevent Shigellosis

Management & Leadership of UNLV VTM production for SNPHL

Through April 2020 and into the Fall, Dr. Wing led a team of volunteers in making VTM(S) media for Southern Nevada Public Health Labs.

Volunteers came from the School of Life Sciences, Department of Chemistry and the UNLV School of Medicine (listed below).

By the end of the project 50,000 vial of medium had been made, which were used by SNPHL Strike teams to test for SARS-Cov-2 (the agent of COVID-19 disease)

UNLV Volunteers:

UNLV SoLS: Monika Karney (Wing Lab Manager and co-lead), Holly Martin (Grad), Tatiana Ermi (Grad), Shrikant Bhute (Post-doc), Isis Roman (Undergrad), Boo Shan Tseng (Asst Prof.) & Cody Cris (Undergrad/Grad).
UNLV Chemistry: Ernesto Abel-Santos (Prof and co-lead), Naomi Okada (Grad), Jacqueline Phan (Grad), Chandler Hassan (Grad), Lara Turello (Grad) & McKensie Washington (Undergrad),
UNLV SoM: James Clark, Michael Briones, Liz Groesbeck & Anita Albanese (all Med students)