Robert Boria  
PhD candidate UC Merced  
Quantitative Systems Biology

Questions:
1. What’s the historical distribution of genetic diversity for small mammals?
2. How climate has affected ecological and evolutionary processes since the LGM?
3. Using ancient and modern DNA, can we forecast genetic diversity into the future?
What is the genomic basis of adaptations to a sugar-rich diet?

Ekaterina Osipova
PhD student

comparative genomics of birds

chickens
ducks
eagles
falcons
parrots
finches
penguins
cuckoos
hummingbirds
honeyeaters
swifts
ostrich

gene candidate validation by genome engineering
gRNA
gene X
Cas9
phenotype?

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Max Planck Institute
of Molecular Cell Biology
and Genetics
**RANGE LIMIT EVOLUTION AND SPECIES DELIMITATION IN A CRYPTIC SPECIES OF SALAMANDER**

*Plethodon kentucki* — cryptic species formerly thought to be a part of the *P. glutinosus* species complex

Small range with high levels of genetic structure

- Should *P. kentucki* be divided into multiple species?
- Does gene flow swamp adaptation at the range edges?
- Does *P. kentucki* have unknown physiological limitations preventing its expansion?

Emily Watts  
PhD student  
Ohio University  
Kuchta Lab
Revealing Genetic Adaptations for Ethanol Metabolism using Comparative Genomics

Swellan Pinto, Master’s Student
Primate Molecular Ecology Laboratory
Department of Anthropology and Archaeology
University of Calgary, Alberta, Canada

1. Does dietary exposure to ethanol impact the evolution of genes involved in ethanol metabolism?
2. Have diverse mammalian species exposed to dietary ethanol evolved similar adaptations to metabolize ethanol through mutations in genes important for ethanol metabolism?

[Diagram showing pathways of ethanol metabolism: ADH/ALDH, Glucuronidation, MEOS]
What adaptations do polar marine mammals have that allow them to thrive in ‘extreme’ environments?

- Dive physiology ~ behavior
- Energy allocation
- Reproduction

Delving into the ‘omics’ during upcoming projects

- Whole genome sequencing
- Evolution of traits (i.e., the gradation in embryonic diapause duration)
SANDRA ALMANZA
MA STUDENT
EVOLUTIONARY PRIMATOLOGY – DEPARTMENT OF ANTHROPOLOGY
HUNTER COLLEGE – CUNY

RESEARCH AREAS:

• DETERMINING THE ORIGINS OF DANIA BEACH GREEN MONKEYS USING PHYLOGENETIC ANALYSIS

• UNDERSTANDING EVOLUTIONARY POSITION OF CERCOPITHECUS DRYAS WITHIN THE CERCOPITHECIN RADIATION USING MOLECULAR GENETICS
1. Why do filamentous fungi need to be hydrophobic?
2. What is the ultimate objective of being hydrophobic? Hypha or spore?
3. How do they (surface-active proteins) evolve in dimorphic fungi like Candida?
Phylogeography and Phylogenomics of Eastern *Plethodon* Salamanders

**Research areas**

- Evolutionary relationships of eastern *Plethodon*
- Post-glacial colonization routes:
  - How did the Eastern Red-backed Salamander traverse the Great Lakes region?
- Hybrid zones:
  - How do clades/species interact upon secondary contact?

*Above*: Eastern Red-backed Salamander (*Plethodon cinereus*)

*Above*: Mitochondrial DNA clades of *P. cinereus* (Radomski, 2017)

**Brian Waldron**
PhD student
Ecology and Evolutionary Biology
Ohio University
Reconstructing the collagenase phylogeny to constrain microbial divergences

Chris Parsons, MIT EAPS
PhD Student, Advisor: Gregory Fournier

ML phylogeny of MMPs (collagenase), constructed in IQTree. Values at internal nodes represent [SH-aLRT (%)/UF bootstrap (%)]

Establishing the ages of Metazoa and Fungi places hard older bounds on the timing of any transfer of collagenases and chitinases, respectively.
Coevolution of Transposable Elements and Zinc-Finger Proteins In Vertebrates

TEs are selfish elements that are ubiquitous in vertebrates (and beyond).

How do TEs evolve?

How do organisms control their activity?

Current favourite organism: *Danio rerio*

Oscar Ruiz
Target enrichment approaches to resolve the molecular phylogeny and study biogeographic diversification of *Platanthera* (Orchidaceae).

**Research Questions?**

1. Is section *Limnorchis* monophyletic relative to other *Platanthera* species?
2. Are the species diagnosed by morphological characters are genetically divergent and represent distinct evolutionary lineages?
3. What are the different geographic diversification pathways of these species?
Thaís Elias Almeida, Ph.D.
Professor of Botany
Universidade Federal do Oeste do Pará, Brazil

My research focuses on plant systematic and evolution, evolutionary biogeography, and floristics, emphasizing tropical ferns and lycophytes.

I am currently interested in:
- understanding taxa evolution and lineage relationships;
- testing if species limits correspond to lineages;
- understanding the main drivers of speciation in ferns and lycophytes in the Neotropics.
“There are no freshwater Crustacea at all like *Aegla* anywhere else in the world” (Schmitt, 1942).
Karn Imwattana
Ph.D student, Duke University, Durham, North Carolina

Systematics and evolution of *Sphagnum capillifolium* complex

• Population genetics and genomics
• Evolution of ecological niches
• Biogeography
• Species delimitation and Taxonomic revision
Research interest:

• Determine the intrinsic DNA-binding preferences of optix (by SELEX).
• Compare the DNA binding specificity of SIX homeodomains in different species.

Optix is the master regulator for red coloring.

Reed, R; Papa, R et al Science (2011)

What I want to learn here?
Determine the evolutionary history of SIX transcription factors.

Optix is a member of the SIX homeodomain family.

Primary endosymbiosis in *Paulinella*

Duckhyun Lhee (PhD student)
Sungkyunkwan University, South Korea

- What is different between photosynthetic system in *Paulinella* and that of other photosynthetic species?
- Understand how free-living cyanobacteria became plastids.
Will (Kum) Shim

University of Texas at Austin

I study tapeworms for a living!

**Interests:**

- Tapeworm Population genetics (Fst, Effective population size, migrations among lakes, population phylogeny)
- Pool seq of different tapeworm populations to find divergent markers among them
**Question:** How is historical geography of Amazonian savannas driving aquatic beetle evolution/speciation.

**Objective/Methods:** Investigate genetic structure of *Suphisellus* species/populations endemic to Amazonian savannas using targeted capture of Ultraconserved Elements (UCEs).

1. Genomic assemblies
2. UCE loci identified, RNA probes generated
3. UCE loci captured from target taxa (sheared DNA) using probes
4. Captured UCE loci aligned
5. Phylogenetic analyses
Leandro Giacomin, PhD
Universidade Federal do Oeste do Pará
Brazil
Professor of Botany

Main interests:
• Systematics and taxonomy of New World *Solanum* (Solanaceae) groups (tomato and potato allies);
• Phylogenomics of *Solanum*;
• Diversification patterns in selected lineages;
• Historical biogeography and trait Evolution;
• Species limits and hybridization processes.
Current Research

- Spatial modelling for persistent clustering and risk areas
- Demonstrating heterogeneity in transmission intensity
- Phylogenetics and phylogeography of dengue

Future Research

- Genetic diversity of Aedes aegypti
Beth Forrestel
Assistant Professor
Dep’t of Viticulture & Enology
University of California, Davis

• Evolutionary, physiological and anatomical basis of drought tolerance in wild grapevine

• Physiological and biochemical responses to heat extremes across diverse grape cultivars

• Modeling physiological responses to heat extremes under variable irrigation regimes

• Grassland biogeography, community ecology & phylogenetics
Ancient origins of bacteriophage RNA polymerase (RNAP)

Alaina Weinheimer
PhD student, Biological Sciences Dept.
Virginia Tech, Blacksburg, VA
Focus: microbial evolution

RNAP β & β' concatenated tree

Where is the root in the tree of life?
How did bacteriophage originate?
Can RNAP be used as a taxonomic marker for bacteriophage?
**Aim 1:** Understand dynamics of plastome evolution.
- Phylogenomic analysis of the genus
- Examine phylogenetic extent of plastome rearrangements
- Characterize synonymous and non-synonymous substitution rates

**Aim 2:** Infer pattern of gene losses using transcriptome analysis.

**Aim 3:** Examine mode of plastid inheritance by performing inter-and intraspecific crosses.

**Hybrid variegation in Passiflora (♂ x ♀):**

**A-B:** *P. menispermifolia* (Bolivia) x *P. menispermifolia* (smooth)

**C:** *P. misera* x *P. misera* (ribbon stem)

**D:** *P. biflora* x *P. organensis*
Investigation of the correlation structure of genetic markers using measures of distance among genealogies derived from these markers.
Strain-level epidemiology in metagenomes

Veda Khadka
Graduate Student, Lieberman Lab
MIT CEE, IMES

Motivations
Strain-level associations with disease
Tracing transmission events: genomic epidemiology
Co-variation in commensal strains
Systematics, Taxonomy and Biogeography of Pleuronectiformes (Flatfishes)

1) Generating a high-density species-level phylogeny using genomic approaches.

Testing macroevolutionary hypotheses:

1) Exploring the links between traits and diversification rates using flatfish as a model system
2) Cope’s rule, Jordan’s rule in fishes
Evolution of Betalains in Caryophyllales

Understanding evolution of biosynthetic gene families

Modelling and reconstructing trait evolution

Detecting and characterising convergent residues

Nathanael Walker-Hale
PhD Candidate
Department of Plant Sciences
University of Cambridge
Linking genotype with the phenotype of natural isolates of rice associated *Methyllobacterium*

Name- Shreya Vichare  
PhD Candidate  
Advisor- Dr. Deepa Agashe  
National Centre for Biological Sciences, India.

- What gives rise to this large metabolic variation?  
- What are the selection pressures that are acting on these bacteria on their plant hosts?  
- What is the evolutionary history of C1 metabolism?
1. Organism seen in tissue does not grow in culture
2. For epidemiologic studies
3. Taxonomic/nomenclatural studies

To detect novel agents of disease

To predict intrinsic resistance to antifungal agents

Identification of fungi from clinical specimens

1. Morphological species concept
2. Biological species concept
3. Phylogenetic species concept
Kuangyi Xu

Theoretical evolution & ecology

Advisors: Maria Servedio & Todd Vision

*The University of North Carolina at Chapel Hill*

**Broad interests in:**

plant reproduction, adaptation & extinction, speciation.

**Current Project:**

1. How do plants avoid extinction by mating system evolution during colonization.
2. Evolutionary rescue dynamics with different types of stochasticity.