7th Annual
St. Louis Ecology, Evolution, and Conservation Retreat

Center for Global Citizenship, Saint Louis University
September 16, 2017

8:00 – 9:00 **Bagels and coffee; sign in; set up posters and talks**

9:00 **Welcome and Introduction**

9:15 *Can phylogenomics unravel rapid radiations?: the order Zingiberales as a case study.* **Monica Carlsen**, Missouri Botanical Garden.

9:30 *As good as the competition? What photosynthesis and allocation patterns say about the shade tolerance of Amur honeysuckle and two native species.* **Kurt Schulz**, Department of Biological Sciences, Southern Illinois University Edwardsville.

9:45 *Trading spaces: changing shelters changes predation of Urbanus dorantes and U. proteus (Hesperiidae).* **Christina S. Baer** and Robert J. Marquis, University of Missouri-St. Louis and the Whitney R. Harris World Ecology Center.

10:00 *Beginning Research on Bumblebee-Pollination Networks in the Chinese Himalayas.* **Alan Moss** and Peter Bernhardt, Department of Biology, Saint Louis University, Zong-Xin Ren, Kunming Institute of Botany.

10:15 **Coffee Break and Posters**

10:45 *A 3D approach to the analysis of movement patterns and home range estimation for the Timber Rattlesnake (Crotalus horridus) in central Illinois.* **Andrew Jesper** and Scott Eckert, Department of Biology and Natural Resources, Principia College.

11:00 *Genomic signature of asymmetric pollen transfer among Burmeistera species.* **Nathan Muchhala**. Department of Biology, University of Missouri-St Louis.

11:15 *The allometry of animal movement.* **Carl Cloyed** and Anthony Dell, National Great Rivers Research and Education Center and Washington University in St. Louis.

11:30 *Local niche-assembly mechanisms influence global patterns of forest biodiversity.* **Dilys Vela Díaz**, Department of Biology, Washington University in St. Louis, Marko J. Spasojevic, Department of Evolution, Ecology, and Organismal Biology, University of California Riverside, Joseph A. LaManna, WUSTL, Jonathan A. Myers, WUSTL, and the Smithsonian Center for Tropical Forest Science-Forest Global Earth Observatory (CTFS-ForestGEO) Network: Norman A. Bourg, Sarayudh Bunyavejchewin, Li-Wan Chang, Jyh-Min Chiang, George B. Chuyong, Keith Clay, Richard Condit, Matthew E. Craig, James W. Dalling, I. A. U. Nimal Gunatilleke, C. V. Savitri Gunatilleke, Chang-Fu Hsieh, Stephen P. Hubbell, Daniel J. Johnson, David Kenfack, Andrew J. Larson, James A. Lutz, Sean M. McMahon, William J. McShea, Vojtech Novotny, Geoffrey G. Parker, Richard P. Phillips, Pavel Samonil, I-Fang Sun, Duncan W. Thomas, Benjamin L. Turner, John B. Vincent, Tomas Vrska, and George D. Weiblen.

11:45 *Temperature influence on mating behavior of male and female Enchenopa binotata (Hemiptera: Membracidae) treehoppers.* **Dowen Jocson** and Kasey Fowler-Finn, Department of Biology, Saint Louis University.

12:00 – 1:00 **Lunch Break**

1:00 *Transmission of pathogen between introduced and endemic carnivores in the Betampona Natural Reserve landscape, Madagascar*. **Fidisoa Rasambainarivo** and Patricia G Parker, Department of Biology, University of Missouri-St. Louis.

1:15 *A new Flora of Missouri; taxonomy & digitization.* **Aaron Floden**, Missouri Botanical Garden.

1:30 *Plant-pathogen interactions over a latitudinal gradient: potential consequences of variation in winter climate.* **Rachel Penczykowski**, Department of Biology, Washington University in St. Louis.

1:45 *Ecological Research at the Shaw Nature Reserve: Past, Present and Future.* **Quinn Long**, Missouri Botanical Garden.

2:00 *The role of complexity in bumblebee partner choice in floral communities.* **Aimee Dunlap**, Department of Biology, University of Missouri-St. Louis.

2:15 *Vitis Underground: below-ground perspectives on plant conservation, diversity, and crop improvement.* **Allison Miller**, Department of Biology, Saint Louis University.

2:30 *Housekeeper or house-crasher? Ecological context and partner genotype influence the impact of endosymbiont colonization in amoebae*. **Susanne DiSalvo**, Department of Biological Sciences, Southern Illinois University Edwardsville.

2:45 *Big brains stabilize populations and facilitate colonization of variable habitats in birds.* **Trevor Fristoe**, Department of Biology, Washington University in St. Louis, Andrew Iwaniuk, Canadian Center for Behavioral Neuroscience, University of Lethbridge, Carlos Botero, Department of Biology, Washington University in St. Louis.

3:00 **Coffee Break and Posters**

Keynote address

4:00 *On the origin of species on islands: signal divergence and speciation in Solomon Island Flycatchers.* **Dr. Albert Uy**, Department of Biology, University of Miami.

5:00 Concluding remarks

5:30 Happy Hour and BBQ at the Humboldt South Pavilion in Tower Grove Park

Oral Presentation Abstracts

Trading spaces: changing shelters changes predation of Urbanus dorantes and U. proteus (Hesperiidae)

Baer, Christina S., University of Missouri-St. Louis and the Whitney R. Harris World Ecology Center; Robert J. Marquis, University of Missouri-St. Louis and the Whitney R. Harris World Ecology Center

Two closely related skipper (Hesperiidae) caterpillar species (*Urbanus dorantes* and *U. proteus*) differ in their vulnerability to natural enemies, despite feeding on the same host species in the same habitat. The caterpillars' most apparent potential defenses against natural enemies are the leaf shelters they build. To determine whether the species' shelters provide different protection independent of caterpillar species identity, we switched caterpillars into conspecific and heterospecific shelters and monitored them for predation and parasitism. This experiment was performed with both early and mid-instar caterpillars to also test whether ontogenetic changes affected predation and parasitism. Predation was intense, with 0-48% of caterpillars surviving depending on treatment. Shelter identity had a significant effect on predation, with caterpillars in *U. proteus* shelters 279% more likely to experience predation than caterpillars in *U. dorantes* shelters ($p = 0.019$). An increased risk of predation was also associated with being a *U. proteus* caterpillar (104% higher, $p = 0.014$) or a mid-instar caterpillar (13% higher, $p = 0.002$). The number of parasitism events (10) was too small to detect differences in parasitism between treatments. This experiment provides the first experimental evidence that shelters made by different caterpillar species provide differential protection from natural enemies.

Can phylogenomics unravel rapid radiations? The order Zingiberales as a case study

Carlsen, Monica, Missouri Botanical Garden; Tomáš Fér, Department of Botany, Charles University, John Kress, National Museum of Natural History, Smithsonian Institution

In general, the evolutionary relationships of early and rapid plant radiations have been difficult to resolve by systematists. The tropical order Zingiberales, the bananas and relatives, which includes eight families, approximately 100 genera, and 2,000 species is a prime example of one such rapid radiation. On one hand, the "Ginger Families" have been well-resolved and well-supported in all previous studies. However, well-supported reconstructions among the basal "Banana Families", which most likely diverged about 90 mya, have been difficult to confirm. In an attempt to resolve this complex evolutionary event, hybridization-based target enrichment was used to obtain sequences from up to 382 putatively orthologous low-copy nuclear genes. Maximum likelihood, coalescence and supertree analyses were performed on this dataset, accounting for varying levels of missing data per taxon and node support. Individual gene trees recovered multiple topologies among the basal lineages, with varying levels of support for these relationships, as did some of the species tree analyses. This lack of resolution strongly depicts the biological reality of an explosive, rapid, and nearly simultaneous radiation in this group of plants towards the end of the Cretaceous, and suggests that even large amounts of genomic data will never fully resolve relationships at this level.

The allometry of animal movement

Cloyed, Carl, National Great Rivers Research and Education Center and Washington University in St. Louis; Anthony Dell, National Great Rivers Research and Education Center and Washington University in St. Louis

Body size explains much variation in how mobile organisms move, such as how fast they move or how maneuverable they are. Studies to date have uncovered important patterns, but are constrained to a limited number and diversity of taxa and/or habitats and/or modes of locomotion. Thus, the generality and patterns of variation of these relationships across the diversity of Earth's surface and biota are unknown. We compiled a global database on locomotor performance that includes 783 species of mobile organism from across the tree of life and multiple environments (land, air, water) to test predictions from general theory, based on metabolic and biomechanical theory, about how locomotor performance scales with body size. Exploratory body speed, maximum body speed, and minimum turn radius all scaled positively, being statistically indistinguishable from the ¼ power law relationships we predicted. Angular speed scaled negatively with size to a ¼ exponent, as we also predicted. These patterns across-species are mirrored for body size variation within 17 species we could compile sufficient data for, with minor differences. Our theory was validated by our empirical dataset and provides a framework for understanding the role of the size dependence of locomotion on the ecological performance of organisms.

Housekeeper or house-crasher? Ecological context and partner genotype influence the impact of endosymbiont colonization in amoebae

DiSalvo, Susanne, Department of Biological Sciences, Southern Illinois University Edwardsville

The consequences of symbiosis can be dynamic, with different genotypes, life-stages, and ecological contexts altering outcomes. My lab explores the colonization process and fitness effects of symbiosis between the soil amoebae *Dictyostelium discoideum* and *Paraburkholderia* bacterial species. Field collected *D. discoideum* are sometimes naturally colonized by *Paraburkholderia* species. We can maintain this colonization in the lab and easily induce or disrupt it by exposing naïve amoebae to *Paraburkholderia* or treating natural hosts with antibiotics. We find that *Paraburkholderia* symbiont isolates group into three species, each having different fitness consequences for host amoebae. Additionally, some natural hosts show higher tolerance for their symbiont isolate than naïve hosts, suggesting potential adaptation to symbiont colonization. *Paraburkholderia* can intracellularly infect amoebae hosts, and appear to be localized within phagocytic vacuoles. Furthermore, we find that *Paraburkholderia* exposure makes hosts susceptible to additional colonization by other bacterial species and that these associations can be beneficial or detrimental to amoebae in a context dependent manner. We believe that the tractability, contextual flexibility, and natural occurrence of this symbiosis makes it a promising system for investigating the mechanisms, consequences, and evolutionary trajectories of eukaryote-bacteria associations.

The role of complexity in bumblebee partner choice in floral communities.

Aimee Dunlap, Department of Biology, University of Missouri-St. Louis.

Pollination systems are a type of biological market, where pollinators trade pollination services to flowering plants in exchange for nectar and pollen. However, partner choice in pollination systems is asymmetric under short time frames, with pollinators better able to modify choice of their floral partners than vice versa. Certain floral traits may aid in balancing this asymmetry by altering the partner choice behavior of their pollinators. Using predictions from decision theory and consumer economics, we investigated the interactive effects of traits hypothesized to produce greater "brand" fidelity: complex advertising, richness of the marketplace, and the paradox of choice. These aspects of choice are predicted to manipulate shoppers through exploiting cognitive constraints. We investigated how three traits of floral communities – the signal distinctiveness of flowers, reliability that certain flower types are associated with a nectar reward, and the number of flower types in a community – affect bumblebee partner choice. By creating small communities of artificial flowers within a full factorial experimental design, we observed the foraging behavior of bumblebees within these communities, testing effects on floral selectivity and sampling, and foraging performance. We find strong effects of each of these floral community traits upon the foraging choices of bumblebees.

A new Flora of Missouri; taxonomy & digitization

Floden, Aaron, Missouri Botanical Garden

The flora of Missouri is relatively well-studied with two checklists of the flora and two floras produced in less than a century. The first iteration contained 2281 species and the latest published checklist contains 2961. Given the results of molecular data, herbarium curation, field studies, new exotics, and taxonomic revision, the flora is dynamic and growing in number. The latest tally shows there are at least 3000 species. I will present the numbers from a working checklist, taxonomic problems, collecting biases in the flora, and the future of the flora in both digital and print formats.

Big brains stabilize populations and facilitate colonization of variable habitats in birds

Fristoe, Trevor, Department of Biology, Washington University in St. Louis; Andrew Iwaniuk, Canadian Center for Behavioral Neuroscience, University of Lethbridge; Carlos Botero, Department of Biology, Washington University in St. Louis

The cognitive buffer hypothesis posits that environmental variability can be a major driver of the evolution of cognition because an enhanced ability to produce flexible behavioral responses facilitates coping with the unexpected. Although comparative evidence supports different aspects of this hypothesis, a direct connection between cognition and the ability to survive a variable and unpredictable environment has yet to be demonstrated. Here, we use complementary demographic and evolutionary analyses to show that among birds, the mechanistic premise of

this hypothesis is well supported but the implied direction of causality is not. Specifically, we show that although population dynamics are more stable and less affected by environmental variation in birds with larger relative brain sizes, the evolution of larger brains often predated and facilitated the colonization of variable habitats rather than the other way around. Our findings highlight the importance of investigating the timeline of evolutionary events when interpreting patterns of phylogenetic correlation.

A 3D approach to the analysis of movement patterns and home range estimation for the timber rattlesnake (Crotalus horridus) in Central Illinois

Jesper, Andrew, Department of Biology and Natural Resources, Principia College; Scott Eckert, Department of Biology and Natural Resources, Principia College

Movement distances (daily, weekly, monthly or yearly) and home ranges of animals can vary greatly due to environmental and biological factors. Sometimes such variation can be attributed to dissimilar research or analytical methodology and sometimes it is the combination of data collection methodology, analytical approaches and environment that leads to conflicting results between studies. One environmental factor that can significantly influence spatial statistics for terrestrial animals is topographical complexity, which is often disregarded in movement studies that use 2-dimensional (planimetric) analysis. In this study we analyze data from a 1 year radio-telemetry study of timber rattlesnake (*Crotalus horridus*) movements and home range in a mature Midwestern Oak-Hickory forest using 3-dimensional distance analysis. We then compare our 3-dimensional results with a planimetric analysis and with published studies on movements and home range of timber rattlesnakes, as we attempt to explain the high levels of variance exhibited across these published studies.

Temperature influence on mating behavior of male and female Enchenopa binotata (Hemiptera: Membracidae) treehoppers

Jocson, Dowen, Department of Biology, Saint Louis University; Kasey Fowler-Finn, Department of Biology, Saint Louis University

Temperature affects a wide range of behaviors, including those associated with reproduction, with potentially important fitness consequences. Here, we look at how temperature affects sexual communication by studying changes in male sexual signals and female preferences. We use the *Enchenopa binotata* treehopper (Hemiptera: Membracidae), a small plant feeding insect that communicates with plant-borne vibrations. We compare the overall thermal sensitivity of male signals and female preferences across three populations. We find high similar sensitivity in all three populations, and also thermal coupling between male signals and female preferences. However, the precise relationship between male signals and female preferences vary across populations, suggesting that temperature may impact sexual selection differently across populations. We encourage investigating the impact of global warming from a population-level perspective.

Ecological research at the Shaw Nature Reserve: past, present and future

Long, Quinn, Shaw Nature Reserve Missouri Botanical Garden; James Trager, Shaw Nature Reserve, Missouri Botanical Garden

The Shaw Nature Reserve's landscape of diverse woodlands, glades, prairies and wetlands provides a living laboratory for ecological research in close proximity to Saint Louis. The Nature Reserve has a long history of influential research, including early, and at the time controversial, studies on the role of fire in shaping Missouri's natural communities. More recent studies have documented the floristic response of Ozark Border woodlands to cedar removal and prescribed fire, while ex-situ experiments with critically imperiled plant species have provided insights for the optimal timing of prescribed fire in Tennessee's limestone glades. Further examples of past and contemporary ecological research at the Shaw Nature Reserve will be highlighted, in addition to an overview of recent advancements to better document both research and applied restoration activities in order to promote the Nature Reserve as a regional destination for basic and applied ecological research.

Vitis Underground: below-ground perspectives on plant conservation, diversity, and crop improvement.

Allison Miller, Department of Biology, Saint Louis University.

Understanding mechanisms shaping phenotypic variation in plants is a fundamental goal in biology and the foundation of domestication and crop improvement. Perennial plants comprise an estimated 40% of domesticated species, 60% of seed plants, and 80% of tropical plant species, and have several key features that influence evolutionary processes in unique ways relative to annual systems. I will highlight the evolution of diversity in perennial plant species and the role of natural plant variation in perennial crop improvement and sustainable agriculture. The focus of my talk will be on variation in nature and under domestication in the lesser-known half of the woody perennial crop equation, the rootstock, focusing on native North American grape species (*Vitis* spp.) used in grafted grapevines. This work includes documenting patterns of genomic and morphological variation in natural populations of North American grapevines used as rootstocks, identifying the genomic basis of phenotypic variation, and exploring root system-shoot system interactions in grafted vines.

Beginning research on bumblebee-pollination networks in the Chinese Himalayas

Moss, Alan, Department of Biology, Saint Louis University; Dr. Peter Bernhardt, Department of Biology, Saint Louis University; Dr. Zong-Xin Ren

Through a collaboration between the Kunming Institute of Botany (Yunnan) and Saint Louis University, graduate student Alan Moss traveled to the Yulong Mountains in Lijiang County to study bumblebee dominated pollination networks. China hosts half the world's known Bombus species and is known for its high floral diversity, including numerous species metaflocks of

montane angiosperm taxa. This diversity makes the region a prime location to study pollination network variations in composition and structure at different elevations. Although beset by daily cultural, technical, and weather-related problems, the resulting compilation of data sets will influence future research over the next two years.

Genomic signature of asymmetric pollen transfer among Burmeistera species

Muchhala, Nathan, Department of Biology, University of Missouri-St. Louis

Species boundaries are often porous for plants, and gene flow between species is often asymmetric. Various post-mating barriers have been shown to cause such asymmetry, including pollen competition, ploidy differences, or postygotic barriers, but only rarely have premating barriers been implicated. Species of the genus *Burmeistera* vary widely in flower morphology in terms of the degree of exsertion of reproductive parts outside the opening, which allows them to partition pollen placement on the heads of their bat pollinators. Experimental work shows that bats will pass some pollen from long-exserted species to short-exserted species, but much less in the opposite direction. Phylogenetic work with >500 gene trees demonstrates that short-exserted species have less stable phylogenetic positions, i.e. lower congruency between gene trees, as would be expected if the asymmetric pollen flow induces asymmetric gene flow. Thus this study provides rare evidence of premating barriers contributing to asymmetric gene flow across a genus.

Plant-pathogen interactions over a latitudinal gradient: potential consequences of variation in winter climate

Penczykowski, Rachel, Department of Biology, Washington University in St. Louis

Studies of plant-pathogen interactions typically focus on ecological and evolutionary dynamics during the growing season. Yet, off-season conditions may be critical drivers of those dynamics between years. For perennial herbs such as Plantago species and their powdery mildew pathogens, cold winters cause hosts to dieback to rootstock, and the fungal pathogens can only survive through sexually produced resting structures. At northern temperate latitudes, variation in winter temperature and insulating snowpack may affect offseason survival of pathogen resting structures, and thus the abundance and genetic diversity of inoculum the following spring. The ecological and evolutionary dynamics of the plant-pathogen interaction may be profoundly different at southern latitudes, where hosts remain green and powdery mildews can reproduce asexually year-round. I will present data consistent with an effect of winter climate on pathogen survival in populations of Plantago lanceolata in Finland. Then, I will describe my plans to investigate the ecological and evolutionary implications of winter for plant diseases through observational and experimental research on Plantago and their fungal pathogens along a latitudinal gradient spanning the Mississippi River.

Transmission of pathogen between introduced and endemic carnivores in the Betampona Natural Reserve landscape, Madagascar.

Fidisoa Rasambainarivo, Department of Biology, University of Missouri Saint-Louis, Madagascar Fauna and Flora Group; Patricia G. Parker, Department of Biology, University of Missouri Saint-Louis,Saint Louis Zoo

The carnivores of Madagascar are at an increased risk of extinction due to the anthropogenic loss of habitat, hunting, and interactions with introduced carnivores. The interactions between introduced and native animals also present the potential for the introduction of pathogens into new host species. With this study, we assessed the exposure of introduced and endemic carnivore species to a variety of viral and parasitic pathogens and identified risk factors associated with the presence of antibodies to these pathogens in endemic carnivores. We found that endemic carnivores are exposed to pathogens spread by domestic animals; these pathogens include canine parvovirus or *Toxoplasma gondii* that may negatively affect their population. Furthermore, we identified demographic characteristics that constitute significant risk factors for the exposure to the parasite. Secondly, we constructed a microbial transmission network between carnivores and attempted to identify individuals or species that may act as superspreaders of disease within that ecosystem. We found that, in Betampona, no species or group of carnivores typically occupy a central network position or act as a bridge between sub-groups. Studying the transmission pathways of *E. coli* in the carnivore community of Betampona provides insights into disease transmission dynamics and may help limit the spread of pathogens in an endangered population.

As good as the competition? What photosynthesis and allocation patterns say about the shade tolerance of Amur honeysuckle and two native species

Schulz, Kurt, Department of Biological Sciences, Southern Illinois University Edwardsville

Amur honeysuckle (*Lonicera maackii*) invades post-agricultural landscapes throughout the Northeast and lower Midwest. It is purported that honeysuckle succeeds in forests because it produces functional leaves well before overhead canopy closure and maintains leaves after tree canopy senescence. Were this true, flower production and perhaps fruit production should not vary greatly across the forest edge/interior light gradient. In fact, they vary greatly. Thus, the relative shade tolerance of understory honeysuckle during summer is important to its success. In a field study we compared the late-summer photosynthetic the light response of 10 honeysuckles to adjacent pairs of two native shade-tolerant understory species, spicebush (*Lindera benzoin*) and pawpaw (*Asimina triloba*). Individuals were naturally established under a canopy of seedling sugar maple (*Acer saccharum*) (PPFD: $\bar{X}$= 5.1, s = 1.2 mol m^{-2} d^{-1}). Light response curves were measured over the range 0-800 µmol m^{-2} s^{-1} at CO_2 = 400 ppm, T_{leaf} = 30 C, and VPD ~ 1.1 kPa. Leaves were harvested to determine chlorophyll and specific leaf mass. In a companion study we examined leaf area and leaf stem mass for shoots of all three species.

The form of area and mass-based photosynthetic light response curves were similar between species (p = 0.22 and 0.07, respectively). Area-based maximum photosynthetic (A_{max}) rate tilted (p = 0.11) slightly higher in spicebush. However, because specific leaf weight in the native

species was half that in honeysuckle ($p < 0.0001$), mass-based A_{max} was nearly 2x greater for the native species than honeysuckle ($p < 0.0001$). If we view shade tolerance as a whole-plant characteristic, plants are more successful if they obtain higher rates of total photosynthesis in relation to investment in biomass. The second study showed that pawpaw and spice bush produce 80 and 50% more leaf area per gram of tissue investment. Incorporating the photosynthetic light response curves, we estimate that pawpaw and spice bush are 30 and 45% more energy efficient than honeysuckle. This is a significant disadvantage in a closed forest habitat.

Local niche-assembly mechanisms influence global patterns of forest biodiversity

Vela Díaz, Dilys M., Department of Biology, Washington University in St. Louis; Marko J. Spasojevic, Department of Evolution, Ecology, and Organismal Biology, University of California Riverside; Joseph A. LaManna, Department of Biology and Tyson Research Center, Washington University in St. Louis; Jonathan A. Myers, Department of Biology and Tyson Research Center, Washington University in St. Louis; and the Smithsonian Center for Tropical Forest Science-Forest Global Earth Observatory (CTFS-ForestGEO) Network: Norman A. Bourg, Sarayudh Bunyavejchewin, Li-Wan Chang, Jyh-Min Chiang, George B. Chuyong, Keith Clay, Richard Condit, Matthew E. Craig, James W. Dalling, I. A. U. Nimal Gunatilleke, C. V. Savitri Gunatilleke, Chang-Fu Hsieh, Stephen P. Hubbell, Daniel J. Johnson, David Kenfack, Andrew J. Larson, James A. Lutz, Sean M. McMahon, William J. McShea, Vojtech Novotny, Geoffrey G. Parker, Richard P. Phillips, Pavel Samonil, I-Fang Sun, Duncan W. Thomas, Benjamin L. Turner, John B. Vincent, Tomas Vrska, and George D. Weiblen.

The mechanisms underlying the striking increase in species diversity from the poles to the equator has puzzled scientists for decades. While many studies have examined the influence of regional mechanisms on global changes in species diversity, surprisingly little is known about the relative importance of different local mechanisms of community assembly across latitudes. We tested the relative contributions of three classic local-assembly mechanisms (niche space, niche breadth, niche overlap) to changes in species diversity across temperate and tropical latitudes using a global dataset of tree communities from 12 large forest plots including 1.2 million trees and 1,946 species. Additionally, we used null models to separate the contribution of niche-assembly versus dispersal-assembly mechanisms. We show that niche-assembly across small-scale environmental gradients (soil resources & topography) explains 42-52% of the variation in species diversity across latitudes. In particular, species in tropical communities had larger abiotic niche breadths and greater abiotic niche overlap than species in temperate communities, suggesting weaker resource competition, weaker species sorting, or a stronger influence of top-down biotic interactions (e.g., pathogens & predators) in the tropics. Our study reveals systematic shifts in the relative importance of different local niche-assembly mechanisms across temperate and tropical latitudes.

Poster Presentations

A count-based method for assessing interactions among threats to rare plants
Bernardo, Holly L., Evolution, Ecology & Population Biology Program, Washington University in St. Louis; Pati Vitt, Chicago Botanic Garden; Rachel Goad, Chicago Botanic Garden; Susanne Masi, Chicago Botanic Garden; Tiffany M. Knight, Martin-Luther-University, Helmholtz Centre for Environmental Research, and German Centre for Integrative Biodiversity Research (iDiv)

Evolutionary history of the genus Camelina (Brassicaceae)
Brock, Jordan, Evolution, Ecology & Population Biology Program, Washington University in St. Louis; Ali A. Donmez, Biology Department, Hacettepe University; Mark A. Beilstein, School of Plant Sciences, University of Arizona

Comparative shifts in the reproductive biology of Tradescantia ohiensis
Caceres, Steve; Alex Spurgeon; Kyra N. Krakos, Department of Biology, Maryville University

The role of soil microbes and plant diversity in pollination and soil carbon sequestration under climate change
Carroll, Erin; Savannah Fuqua; Claudia Stein; Scott Mangan, Department of Biology, Washington University in St. Louis

Fecal glucocorticoid patterns among felids during quarantine and animal transfers
Clawitter, Helen, Reproductive and Behavioral Sciences Department, Saint Louis Zoo; Fieseler, Carol, Animal Health Department, Saint Louis Zoo; Kozlowski, Corinne, Reproductive and Behavioral Sciences Department, Saint Louis Zoo; Bircher, Steve, Carnivore Department, Saint Louis Zoo; Hartell-DeNardo, Julie, Carnivore Department, Saint Louis Zoo; Powell, David, Reproductive and Behavioral Sciences Department, Saint Louis Zoo

A five year study of the stability of the pollination system of Monarda fistulosa
Czapla, Grant; Kyra N. Krakos, Department of Biology, Maryville University

The reproductive biology of a glade populations of Parthenium integrefolium
Deterding, Deanna; Kyra N. Krakos, Department of Biology, Maryville University

A putative autonomous element for the car transposon of Schizophyllum commune
Fowler, Thomas; Belainesh Nigeda, Department of Biological Sciences, Southern Illinois University Edwardsville

The pollination system of Penstemon cobaea
Glass, P. Xavier; Kyra N. Krakos, Department of Biology, Maryville University

Population genetics of seashore Paspalum
Goad, David, Department of Biology, Washington University in St. Louis; Ivan Baxter, Donald Danforth Plant Science Center; Elizabeth Kellogg, Donald Danforth Plant Science Center; Kenneth Olsen, Department of Biology, Washington University in St. Louis

Comparative Analysis of Wild Annual and Herbaceous Perennial Astragalus (Fabaceae)
Herron, Sterling and Claudia Ciotir, Department of Biology, Saint Louis University

Investigating Sources of Phenotypic Variation in the Perennial Legume, Lupinus polyphyllus
Herron, Sterling and Claudia Ciotir, Department of Biology, Saint Louis University

Morphometric and genetic analysis of North American grapevine Vitis species
Kingeter, Christian; Erin Knight; Danielle Hopkins; Laura Klein; Allison J. Miller, Department of Biology, Saint Louis University

The breeding system of Campanula americana
Krupp, Taylor; Kyra N. Krakos, Department of Biology, Maryville University

Temporal variation in the pollination systems of Campanula americana
Luth, John; Alexandra Spurgeon; Kyra N. Krakos, Department of Biology, Maryville University

Diaspore diversity in the tribe Andropogoneae
McAllister, C.; B. Bookout; S. Clewell; K. Biang; M. McKain; E. Kellogg

Adapting perennial crops for climate change: graft transmissible effects of rootstocks on grapevine shoots.
Miller, Allison, Department of Biology Saint Louis University, Dan Chitwood, Ann Fennell, Laszlo Kovacs, Misha Kwasniewski, Jason Londo, and Q. Ma:

You can count on Dictyostelium: exploring infection dynamics of Paraburkholderia symbionts
Miller, Jacob; Susanne DiSalvo, Department of Biological Sciences, Southern Illinois University Edwardsville

What lurks beneath the soil: isolating bacteriophages specific to Paraburkholderia
Price, Lance; Susanne DiSalvo, Department of Biological Sciences, Southern Illinois University Edwardsville

Undercover agents: exposing unculterable Neochlamydia endosymbionts of the slime mold Dictyostelium discoideum
Renfroe, Dierdra; Madison Eschbach; Susanne DiSalvo, Department of Biological Sciences, Southern Illinois University Edwardsville

All shook up: reconstructing the ancestral sexual mode of animals
Sasson, Daniel, Department of Biology, Saint Louis University; Joseph Ryan, Whitney Laboratory for Marine Bioscience, University of Florida

Strychnos ignatii: an ethnobotanical study of a deadly bean from the Philippines to the last Medici Princess
Shannon, Olivia, Department of Biology, Maryville University; Ashley Buchanan, Department of History, Mercer University; Kyra N. Krakos, Department of Biology, Maryville University

The reproductive ecology of Castilleja coccinea in a Missouri glade habitat
Spurgeon, Alex; Taylor Krupp; Kyra N. Krakos, Department of Biology, Maryville University

Gene Expression in the Ant Brain During Normal and Abnormal Behaviors.
Stanley, Ryan, Krystal Meza, Joseph Elfrink, Stephanie Schroeder, Ravin Kodikara, Victoria Brown-Kennerly, Department of Biological Sciences, Webster University.

Coexistence in tallgrass prairies: the importance of plant-soil microbial feedbacks and phylogenetic relatedness
Stein, Claudia, Department of Biology and Tyson Research Center, Washington University in St. Louis; Scott Mangan, Department of Biology, Washington University in St. Louis

The pollination biology of hybrids of Echinacea simulata and Echinacea paradoxa
Stumbo, Joe; Kyra N. Krakos, Department of Biology, Maryville University

Eastern Prairie Fringed Orchid seed germination potential using different orchid mycorrhizae fungi
Tatum, Kayla; Elizabeth Esselman, Department of Biological Sciences, Southern Illinois University Edwardsville

The ontogeny of nestmate recognition cue development in the honey bee, Apis mellifera
Vernier, Cassondra, Department of Biology, Washington University in St. Louis; Joshua Krupp, Department of Biology, University of Toronto Mississauga; Katelyn Marcus, Washington University in St. Louis; Abraham Hefetz, Department of Zoology, Tel Aviv University; Joel Levine, Department of Biology, University of Toronto Mississauga; Yehuda Ben-Shahar, Department of Biology, Washington University in St. Louis

Digital Leaf morphometrics and ionomics of grafted grapevines growing in a research vineyard
Weigl, Olivia, Niyati Bhakta, Laura Klein, Zoë Migicovsky, and Allison Miller, Department of Biology, Saint Louis University

Job Board

The Department of Biological Sciences at the Missouri University of Science & Technology invites applications for the tenure-line position of Field Station Director to begin Fall Semester, 2018. This founding director will take the lead in the development of a newly established field station, located 30 minutes from campus, and situated among diverse Ozark upland habitats. The program has recently been awarded an NSF planning grant, and is an OBFS institutional member. The candidate will teach classes on campus and at the field station, advise graduate (M.S.) and undergraduate students in research, and coordinate the activities of members of interested departments, including geology, chemistry, environmental engineering, social science, and humanities. Candidates must have a Ph.D., a strong publication record, and an active, externally funded research program in an area related to field biology. Appointment can be at associate or full professor, depending on experience. To apply, use Reference # 0070215 http://hr.mst.edu/careers/academic/

M. S. Graduate Assistantship in Crayfish/Invasive Species Biology at the Illinois Natural History Survey/University of Illinois at Urbana-Champaign

Selected student will be part of a collaborative team of researchers examining the distribution of the invasive Virile Crayfish in southern Missouri. Project will involve substantial fieldwork in the Current River drainage within the Ozark National Scenic Riverway collecting crayfishes and water samples and measuring habitat variables. Laboratory work will focus on the development and testing of environmental DNA assays for the detection of invasive crayfishes in lotic waterways. Selected applicant would also be required to assist with some fish and crayfish sampling across Illinois.

Assistantship would include a monthly stipend for 24 months (current rate is $1950 per month) and a tuition waiver at the University of Illinois Urbana-Champaign.

Selected student will work under the direct supervision of Dr. Christopher Taylor at the Illinois Natural History Survey and Department of Natural Resources and Environmental Sciences and will work in collaboration with Dr. Eric Larson in the Department of Natural Resources and Environmental Sciences and National Park Service staff.

Requirements: BS in Ecology, Zoology, Fisheries, Biology or other related field and competitive GRE scores. Strong analytical skills are preferred.

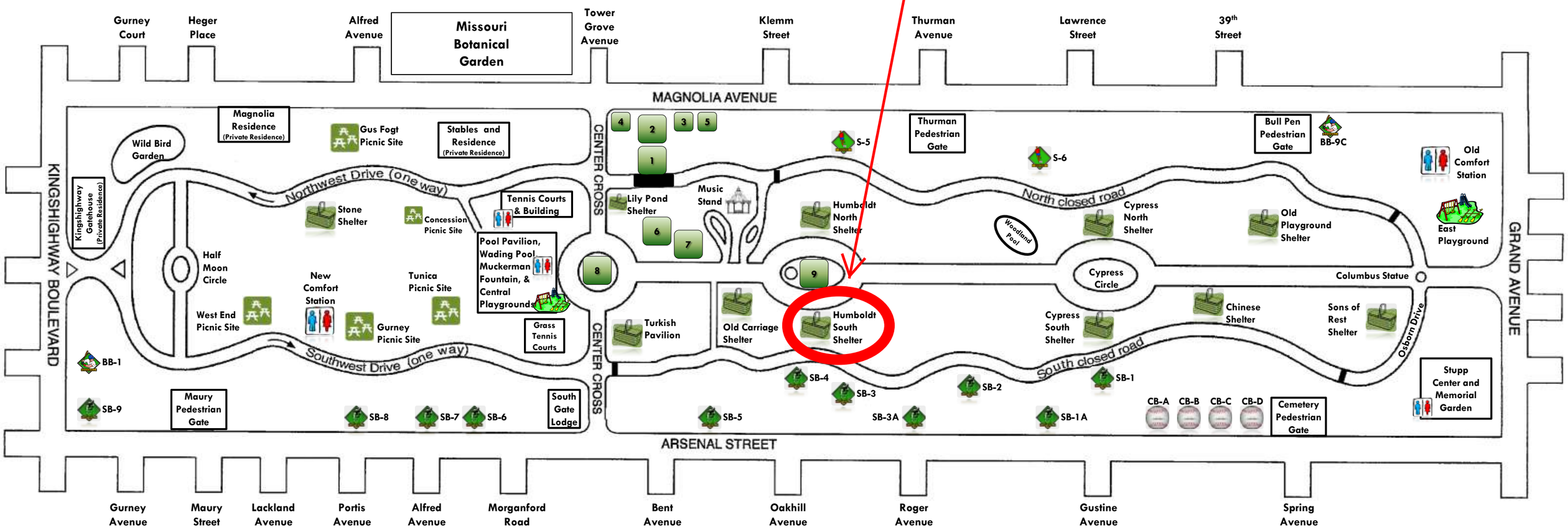
Start Date: Graduate Assistantship would begin on 15 January 2018.

To inquire about the project or to apply, contact Christopher A. Taylor at 217-244-2153, cataylor@illinois.edu

Tower Grove Park Map

4256 Magnolia Avenue
St. Louis, Missouri 63110
314-771-2679

Evening BBQ location



Tower Grove Park is open daily from sunrise to 10 p.m.

Tower Grove Park is a public park owned by the City of St. Louis, and governed by a Board of Commissioners appointed under the authority of the Missouri Supreme Court.

Tower Grove Park is a National Historic Landmark founded and donated by Henry Shaw.

Visit us at www.towergrovepark.org

Legend:

1 – Piper Palm House
2 – Piper Plant House (**Park Office**)
3 – Park Greenhouse
4 – Director's Residence
5 – Park Maintenance Complex
6 – Lily Ponds
7 – Ruins and Fountain Pond
8 – Shakespeare Statue and Flag Circle
9 – Humboldt Statue and Humboldt Circle

Ball fields Legend:

BB = Baseball
S = Soccer
SB = Softball
CB = Corkball