

Anecia Gentles

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Education

Rice University, Houston, TX

Bachelor of Science in Ecology and Evolutionary Biology

May 2018

Skills

Excel, Word, PowerPoint, ImageJ, R (basic), ArcGIS (basic)

Gel electrophoresis, SDS-Page,

Research Experience and Relevant Projects

Dr. Amy Dunham Lab, Rice University, Houston, TX

Senior Honors Research Student

Deforestation and malaria prevalence in Sub-Saharan Africa

| Aug

2017 – Present

- Developed research methods for modeling relationship between deforestation and malaria prevalence using R and ArcGIS
- Selected and analyzed data: Prevalence maps from the Malaria Atlas Project and deforestation maps from the University of Maryland Dept. of Geographical Sciences
- Presented findings of this study at the Rice Undergraduate Research Symposium (April 2018)
- First author manuscript in preparation

Independent Research Student

Effects of Frugivore Decline on Carbon Sequestration in Madagascar

| Jan 2016 - Present

- Determined the biomass of tree species in Ranomafana National Park, Madagascar to understand its relationship with dispersal mode
- Used R to model the loss and replacement of trees that are dispersed by lemurs to understand the possible fluctuations in biomass
- Presented the preliminary findings at the Rice Undergraduate Research Symposium (April 2017), Texas Association of Biological Anthropologists (November 2016), Ecological Society of America (2018)
- Co-authored manuscript in press

Dr. Eltzschig Holger Lab, University of Texas Health Science Center, Houston TX | Jun 2017 – Jul

2017

Intern

Endometrial Cancer Research

- Shadowed researchers to learn various lab procedures involving CD73 expression in cancerous endometrial cells with Dr. Jessica Bowser

Dr. Volker Rudolf Lab, Rice University, Houston, TX

Research Assistant (\$8/hr)

Aquatic Community Ecology Project

| Jan 2015 – Aug 2015

- Collected 300+ specimen from ponds and streams using nets to study community-level aquatic interactions
- Measured chlorophyll levels in experimental ponds using a spectrophotometer to assess water quality
- Prepared specimen for nutrient analysis
- Measured specimens using ImageJ

Scientific Publications

Razafindratsima, O.H., **Gentles, A.**, Drager, A.P., Razafimahaimodison, J.C., Ralazampirenana, J., Dunham, A.E., (2018-in press) Consequences of lemur loss for above-ground carbon stocks in a Malagasy rainforest. *International Journal of Primatology*
<https://link.springer.com/article/10.1007/s10764-018-0042-x>

Scientific Presentations

Consequences of lemur loss for above-ground carbon stocks in a Malagasy rainforest, Ecological Society of America Annual Meeting, Special Section: Frugivores and Seed Dispersal in the Anthropocene | Aug 2018

Does deforestation decrease the prevalence of Malaria? Rice University Research Symposium | Apr 2018

Lemur declines threatens carbon sinks in Madagascar, Rice University Research Symposium | Apr 2017

Lemur decline threatens world's richest plant diversity hotspot, Texas Association for Biological Anthropology Annual Meeting | Nov 2016

Team Projects and other Experiences

Conservation Lab, Rice University, Houston, TX | Aug 2016 – Dec 2016

Restoration Project Team Member

Urban Prairie Restoration Project

- Assessed the biodiversity of the Harris Gully Natural Area of Rice University to draw up a proposal for land use
- Presented proposal to Lynn Lowrey Arboretum Committee
- Outcome: prairie restoration initiated on Rice University campus in 2018

Intermediate Experimental Biosciences, Rice University, Houston, TX | Jan 2016 - May 2016

Team Member

Investigating Ideal Absorbances for Phusion Production

- Using the Protzko protocol for Taq polymerase production
- Varied the length of time that the flask was shaken before inducing the expression of Phusion
- Analyzed production using SDS-Page

Introductory Biological Research Challenges, Rice University, Houston, TX | Jan 2015 - May 2015

Team Member

The jasmonate pathway of Arabidopsis in defense of fungal attack

- Infected *Arabidopsis* plants with *Botrytis cinerea* using micropipettes to view defense response
- Qualitatively assessed plant damage using a 4-point scoring system

South Plains Regional Science and Engineering Fair, Texas Tech University, Lubbock, TX | Feb 2013

Researcher

The effect of COREXIT on the bioluminescence of dinoflagellates

- Added various amounts of COREXIT (oil dispersant used in BP oil spill of 2010) to dinoflagellate environment
- Measured light output with light sensor

Abstract: Does deforestation increase the prevalence of malaria in Central Africa?

As human impacts on the natural world continue to increase, understanding relationships between environmental change and disease has become increasingly urgent with implications for human health and policy. For example, deforestation is known to increase local abundance of mosquito species that carry malaria. However, little is known about how forest loss relates to malaria prevalence. Understanding these relationships are especially important in regions such as Central Africa where large undisturbed tracts of forest have become increasingly deforested. To address this, I explored the relationship between deforestation and the prevalence of malaria in children ages 2-10 in Central Africa between the years of 2001-2010. Maps of yearly forest loss and malaria prevalence data were used to determine whether forest loss was associated with an increase in malaria prevalence over time. We found that increasing amounts of forest loss is strongly associated with increasing malaria prevalence. Understanding the link between deforestation and disease is critical for both predicting and managing outbreaks in a world of increasing environmental change. This knowledge could also be applied to develop a greater understanding of how deforestation affects other vector habitats, and in turn, human health.

Statement of Interest and Intent

It wasn't until the end of my junior year at Rice University that I realized how the courses I had been advised to take and planned to take would leave me completely unprepared to understand how best to modify an existing R model for my own project or to design one myself. After months of puttering around and only making a few strides in a project, I handed the code off to the senior investigator and she finished it in a couple of weeks. Although I took all the classes recommended to complete a Bachelor of Science in ecology, it only included a year-long introduction to calculus and a basic statistics course. The end of my junior year was definitely not the time to change my four-year plan if I was to graduate on time. For that reason, I chose to take this year to focus on the gaps in my knowledge of statistical modeling before I enter grad school, and I know that E²M² would be instrumental to the development of my foundation in disease ecology.

This past year, I conducted a temporal study of the prevalence of malaria in deforested areas for my senior honors research. I used ArcGIS to process map data from Sub-Saharan Africa to determine whether or not there is a correlation between deforestation in one year and the prevalence of malaria in the next year. For example, deforestation data of 2001 was paired with data from malaria prevalence data of 2002 for each 22.5 sq. km cell in a grid across the region. This method allowed me to see how the effects of deforestation in one year may have caused changes in malaria prevalence in the following year. The data from this project spanned ten years. My preliminary findings showed that the average the level of malaria prevalence of one year increases with the average percentage of forest loss in the previous year. While this relationship was exciting to find for my first solo project, the study itself lacks the statistical foundation to make it publishable work. During my time at E²M², I would like to revisit this project and use what I learn to make predictions about the fate of the region if deforestation continues at different at larger or smaller scales to see if the relationship holds true.

Participating in E²M² would be the first step towards continuing my education in disease ecology. Ultimately, my goal is to research how land use and human development affect the ecology of diseases. I was inspired to pursue this field by a number of speakers in a One Health seminar on tropical diseases who emphasized the necessity of integrating ecology into the study of diseases if we are to truly understand how a healthy environment can increase the likelihood of healthy people. However, I've learned that in order to join them in this pursuit of knowledge, I have a significant amount of foundation building to do. For every question I develop, I want to know that I have the tools to answer them and that all I have to do is apply myself, and I believe E²M² could help me achieve that.