

# Welcome to the annual newsletter for the Howard Hughes Medical Institute – Cornell University Research Transfer (HHMI-CURT)

The 2020 CURTellian in retrospect!

*If you have any feedback or comments about this newsletter, please email HHMI-CURT at [hhmi-curt@cornell.edu](mailto:hhmi-curt@cornell.edu).*

## Program Directors



*Avery August, PhD.*



*Melanie J. Ragin, PhD.*

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In reminiscing our second year in action, we pay tribute to our humble beginnings, check out this [article](#) to see how we got started.

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This year would not have been a smashing hit without your support and participation in the HHMI-CURT program. If you'd like to see more of what we are doing check out our website or social media platforms on [Instagram](#) or [Twitter](#)

Created by Narda Bondah  
Edited by Candice Limper and Margit Chamberlain-Czebiniak

# Foreword message from Dr. Melanie Ragin

**“It’s not what happens to you, but how you react to it that matters.” ~Epictetus**

**Resilient, Strong, Resourceful.** These are the ways in which HHMI-CURT Scholars responded to upending of our lives as a result of the pandemic in 2020. The Scholars’ ability to pivot to a virtual “reality” almost overnight in response to the collectively jarring and unique challenges 2020 presented academically, socially and personally with no control was, and has been, nothing short of impressive. In an instant undergraduate research was effectively non-existent, access to academic and social connections on which students came to rely became almost impossible to access. Scholars, along with all undergraduates, were required to uproot and change their lives losing connections to research teams, academic resources, and peer networks. On an individual level this remarkable nature of the pivoting, adjusting and redefining came at huge personal expense to adults that are undergraduates that do not engage as well in an online learning environment, are developing identities in an academic space that may be safer and more validating than other places where they may have had to return. Additionally, lives were disrupted for those that may have been navigating being on their own for the first time or on their way to graduating and navigating a life as a graduate or professional student or starting their careers.



**Resilient, Strong, Resourceful**

HHMI-CURT was established to support the successful transition of community college transfer students to Cornell through research engagement and placement, access to campus resources and community-building. During these challenging times our goal was to continue this mission, although we were forced to pivot by incorporating innovative and creative ways of having Scholars continue to engage in research (i.e., reading papers and creating a new Innovation and Creative design course), along with expanded offerings around well-being and social support through movie nights and unstructured discussions.

As we continue to be hopeful about what this new year will bring, we are proud to say that HHMI-CURT Scholars' have shown a grace and patience, during the toughest times the world has known, that requires a level of maturity that community college transfer students bring to our community. This experience of our Scholars, who were instantaneously forced to pivot and engage differently with the world, has helped us redefine and reassess how we can best support the students, but most importantly the whole person. Our scholars make the HHMI-CURT program what it is today.

We are grateful, humbled, and eager to see what the future will bring. It will not be like it was prior to March 2020, it will be better. As an institution and as individuals, we will be stronger, smarter and even more resilient.



Dr. Avery August, Brandon Carlson-Clarke, Love Nemecek, Daniel Vitenson, Julio Salas, Lawrence Onyekwere, Ayanna Dixon, Leia Parrish, Dr. Melanie Ragin (left to right).

# Student Spotlight: Ayanna Dixon



## **1. Tell us a little bit about yourself**

I am currently a senior in the College of Agriculture and Life Sciences majoring in Animal Science. I transferred from Collin County Community College in Texas to Cornell as a sophomore. After graduation, I will be attending vet school, specializing in production animals specifically dairy cattle. I hope to open my own mixed animal veterinary practice one day.

## **2. How has the HHMI-CURT program helped you prepare for the next steps or helped you become a better scientist - how has the community helped you through your program?**

HHMI-CURT has helped me to seek out my own potential and grow that potential. Through getting involved in a research lab with Dr. Ragin and Dr. August's help, I found out what it was like to work independently on a project, see it through the trials and difficulties, and then reap the fruits of the end results. Through talking with other undergraduate researchers, I was able to not feel so bad about my shortcomings, knowing that others had similar experiences. When presenting at different events, we were able to help one another practice and become proficient at public speaking, providing feedback that helped each of us reach our potential.

## **3. What advice would you give to incoming students?**

I would tell incoming students to stick with it. Transferring from a community college to a four-year university is tough, but the HHMI-CURT program will help to give you a sense of community and give you a different perspective on the possibilities that are available in research and in academia.

## **4. What is something you wish you knew coming into the program?**

I would say that I wish that I knew to reach out to Drs. Ragin and August sooner. They really were the most helpful in my transition. Whether it was checking in to

see how things were going or providing presentations on practical aspects of moving through academia from undergraduate through to graduate school.

**5. Who is your research advisor and what are you researching on and its objectives?**

My advisor is Dr. Julio Giordano, and his lab focuses on looking into the physiology and management of reproduction dairy cattle. Reproductive management of cattle is critical to profitability and sustainability of both dairy and beef cattle operations. Determination of cow ovarian and pregnancy status is key for managing reproduction and could be used to assign cows to specific treatments, complement non-pregnancy diagnosis, and confirm estrus.

**6. Please tell us about honors or awards you have received**

- Undergraduate Scholastic Achievement Award from the American Society of Animal Science
- Graduated from Collin County Community College with an Associates of Science Magna Cum Laude
- Dean's List at Collin County Community College Spring 2018
- President's List at Collin County Community College Fall 2017
- Dean's List Cornell University Fall 2018, Spring 2019, Fall 2020

**7. What are your hobbies?**

I like to play the ukulele and read. When it is nice out, I like to take bike rides around my hometown.

# Student Spotlight: Sasha Anronikov



## **1. Tell us a little bit about yourself**

I am a junior in CALS majoring in biological sciences and minoring in business. I am interested in biomedical research, and I plan to pursue a PhD in that field.

## **2. How has the HHMI-CURT program helped you prepare for the next steps or helped you become a better scientist- how has the community helped you through your program?**

As an out-of-state transfer from a small town, I was nervous about coming to campus and not knowing a single face. The HHMI-CURT program welcomed me with open arms. Beyond delivering the professional benefits of networking and getting involved in research, HHMI-CURT fosters a close-knit community of support, care, and engagement.

## **3. What advice would you give to incoming students?**

Do not ever be afraid to ask for help.

## **4. What is something you wish you knew coming into the program?**

HHMI-CURT is there to help in any way possible, even if it is outside of research. Everyone you meet in the program is a mentor. Even if there is no official title attached to it, we all guide each other in some capacity.

## **5. Who is your research advisor and what are you researching on and its objectives?**

Since the summer of 2019, I have been conducting immunology and virology research in the August Lab with Dr. Avery August as my research advisor. My current project involves comparing the immune response of specific pathogen free (SPF) mice to influenza infection to the response of pet-store exposed (PSE) mice. The current mouse model, the SPF mouse, is raised in an ultra-sterile environment

and never encounters antigens that would build up its immune system. Researchers have concluded that the immune system of an SPF mouse more closely resembles the immune system of a human neonate rather than an adult human. The discrepancy between the current mouse model and the human adult immune system could explain why some experimental results do not clinically translate into human studies. This has led researchers to call for the establishment of a dirty mouse model, such as mice bought from a pet store. However, before implementing it, researchers must have a comprehensive understanding of the model, including how it responds to infection. The objective of my research is to illuminate the specific differences between the immune responses of SPF mice and PSE mice.

**6. Please tell us about honors or awards you have received**

Annual Biomedical Research Conference for Minority Students (ABRCMS) Travel Award in 2019.

**7. What are your hobbies?**

I enjoy fishing, photography, snowboarding, and collecting sea glass. I am also a self-proclaimed ice cream enthusiast.



# Annual Biomedical Research Conference for Minority Students (ABRCMS) conference

## Cannabinoids and Environmental Stress: It's all about the Genetics

Justin Closser, George Stack, Larry Smart  
Ph D., Plant Breeding and Genetics,  
Cornell University

Special thanks to  
Smart Lab: HEMP Research Team  
Dr. Larry Smart, George Stack  
HHMI-CURT Program  
Dr. Melanie Ragin, Dr. Avery August  
Joss Rose Lab: Cannabinoid Analysis

### Introduction

Hemp is a re-emergent agricultural crop that has a wide array of uses that revolve around grain, fiber and essential oil production. The products of highest interest are cannabinoids, which are produced in the glandular trichomes of the plant (Livingston et al 2019). The most notable of these are tetrahydrocannabinol (THC) and cannabidiol (CBD).

The Federal legal limit for THC is .3%, and plants that rise above this are noncompliant (a.k.a. hot). Frequently plants in the field are surpassing this threshold- resulting in loss of time, money, and crop. Many farmer's attribute their plants going hot to the influence of environmental stress, which presented a need for investigation

### Objectives and Hypothesis

To determine the effect, if any, that environmental stress plays in cannabinoid production in hemp plants.

Since trichomes have often been speculated to be produced as a defense mechanism against pathogens (Rodziewicz et al 2019), I hypothesized that there would be an increase in their production in response to stress stimuli, and consequently THC/Cannabinoids as well.

### Methods

288 plants total, 3 Cultivars (TJ, T2 RNF) were subjected to stress treatments as follows: Ethephon, Flooding, Wounding, herbicide, PM inoculation, and a control

Both neutral and acidic forms of cannabinoids(CBD, THC, CBC, CBG, CBDV, THCV) were measured and quantified using HPLC at 4 different timepoints throughout growing season. The totals and ratios were explored and analyzed using RStudio.

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## Hemp going HOT?: Environmental stress is not a significant factor.

-Exceeding the THC threshold appears to be more by genetics and time than by environmental conditions.

-There is a positive correlation between increasing CBD and THC

-Consider growing CBG dominant and cannabinoid free plants to maintain federal compliance

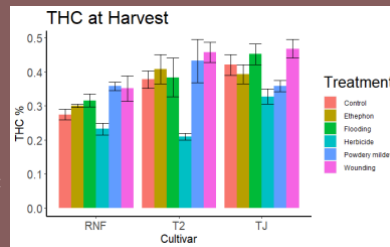


Fig. 1- Stress treatment influence on THC production

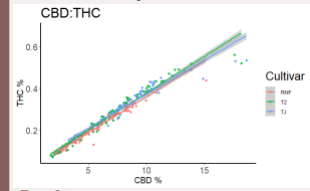


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Contact: jmc748@cornell.edu

Fig. 2-As overall CBD % increases, so does THC, even in CBD dominant plants.



### Results

None of the stress treatments tested here displayed any significant increase in THC production(Fig 1).

The only stress factor that showed a statistically significant difference in THC content was the herbicide treatment, which displayed a significant decrease in THC (as well as overall cannabinoid) content. These bars represent averages, so while the peaks of the bars look different, it is important to consider the margin of error (Figure 1).

A strong correlation was observed between CBD content and THC content across all three cultivars, as well as all six treatments. As the season went on, content of all cannabinoids increased gradually.

### Discussion

My hypotheses, as well as the beliefs of the farmers, were incorrect. There is no significant increase in THC/cannabinoid production in response to the implemented stresses.

There is a correlation between THC increase and CBD increase, suggesting that they are synthesized by the same enzyme in a fixed ratio (Zirpel 2018). There was no effect of stress on the ratio of CBD:THC (Fig 2). This fixed ratio was also observed and discussed in Toth et al 2020. The production of cannabinoids would then seem to be moderated by genetics of the plant.

Further stresses to consider for treatment evaluation would be intermittent/prolonged drought, over-fertilization, and pest pressures (i.e. spider mites, thrips, aphids).

An important note is that the ratios were not affected by any of the stress treatments tested, which would likely remain the case for any untested stress.

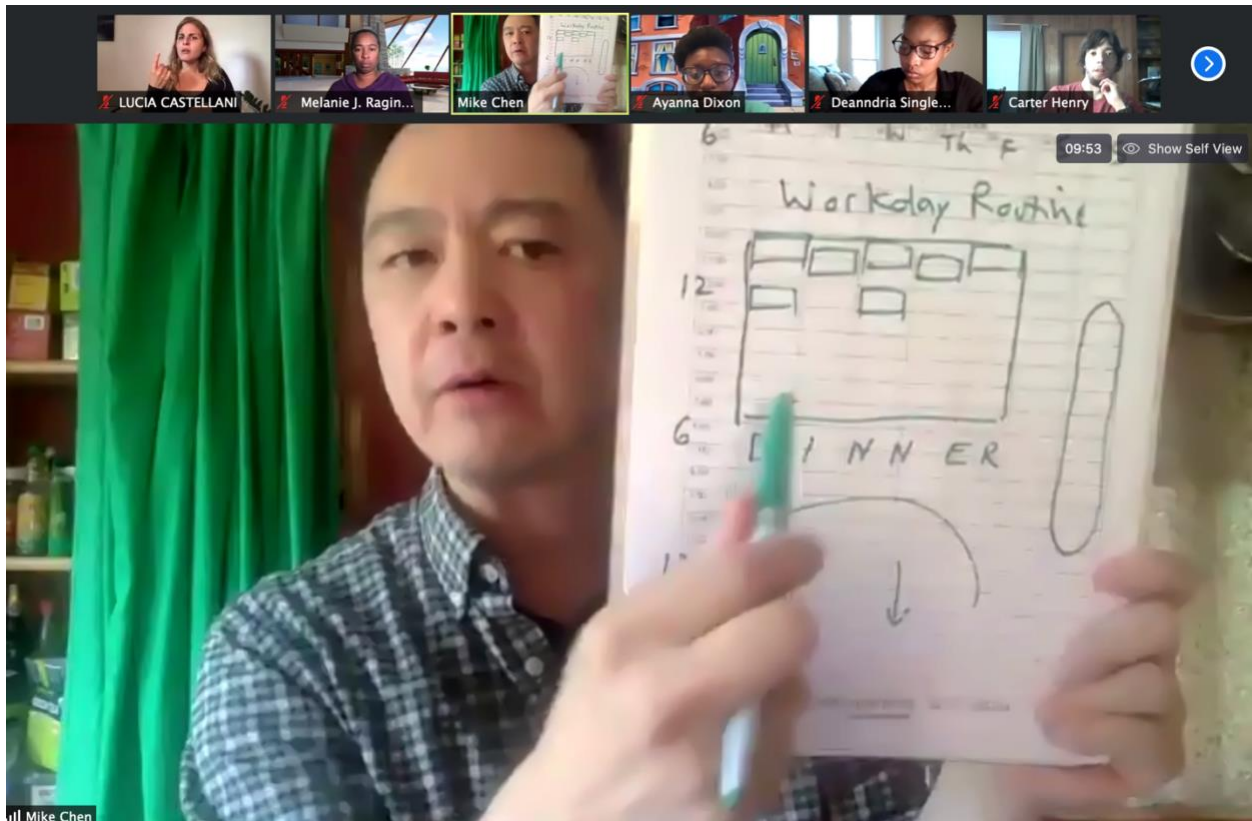
To maintain compliance a farmer may want to choose a CBG dominant or cannabinoid free plant (de Meijer and Sutton 2009), or harvest early, as earlier timepoint tissue testing resulted in compliant levels of THC.



Poster presentation by HHMI-CURT Scholar, Justin Closser at ABRCMS 2020: The Virtual Experience.

# Speaker Highlight

Among the many speakers that we had this year was Michael Chen who is a study skills coordinator from the Learning Strategies Center at Cornell University. Mr. Chen educated scholars on the importance of time management.



Mr. Michael Chen presenting a visual of a workday routine calendar at the virtual time management workshop.

**“My favorite part of this workshop was learning the correlation between stress and time management.”**

# Community Building Activities

In these unprecedented times of a global pandemic, it was especially essential to bring our community together through fun and educational activities. As such, we socialize through virtual game and movie nights and also kept one another on our toes with weekly research updates.

## Weekly Research Updates

**FIG Lab** Figuroa Interdisciplinary Group (FIG) Laboratory  
Conceptual Framework

LIFE COURSE INFLUENCES (ie. history, politics, society, environment, culture) over time

**Childhood Obesity**

**CHILDREN'S ENERGY BALANCE**  
(1) Diet (2) Physical Activity  
(3) Sleep (4) Sedentary Behaviors

**SOCIO-CULTURAL FACTORS**  
(1) Race/Ethnicity (2) Acculturation  
(3) Socioeconomic Status (4) Ethnic Identity

**CAREGIVING/PARENTING**  
(1) Roles and dynamics (2) Practices  
(3) Behaviors (4) Outcomes

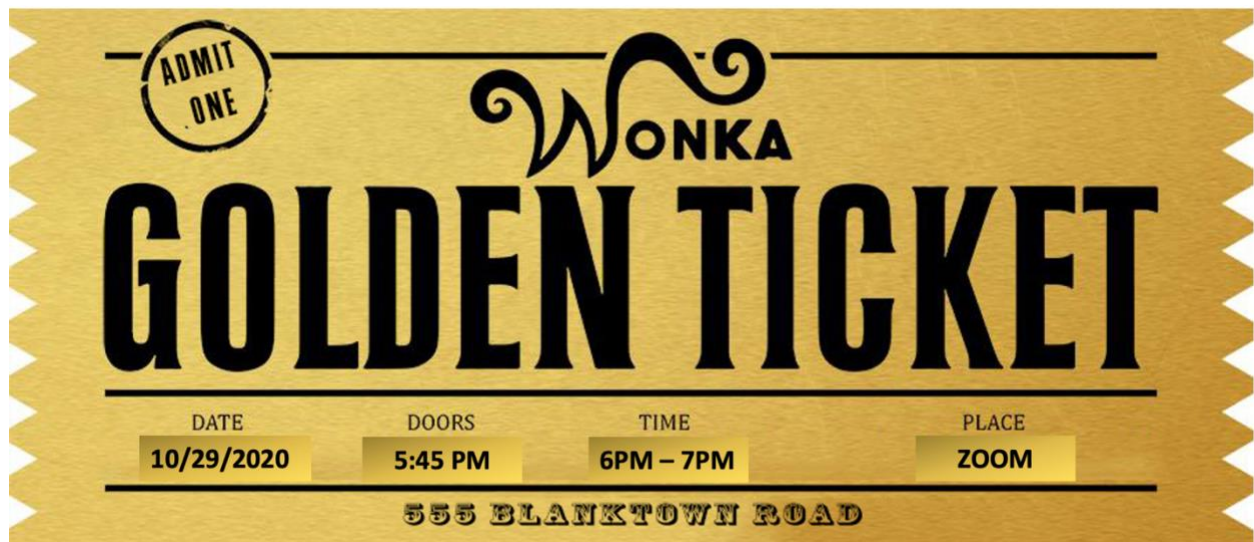
Research updates  
Julio Salas

Julio Salas presenting his collaborative project called Brain Days in the FIG Lab. His research focuses on designing and teaching neuroscience lesson plans to K-4th graders at the Syracuse Academy of Sciences.

# Movie and Game Nights



Some of the movies featured in our movie nights.



An escape room activity where scholars had to collaborate in teams to find their way out of Willy Wonka’s Chocolate Factory.

# Undergraduate Resources

[CAPS - mental health](#)

[Writing resources](#)

[Fellowship](#)

[Confidential pantry](#)

[Learning strategies center](#)

