



NEWSLETTER

March 2022

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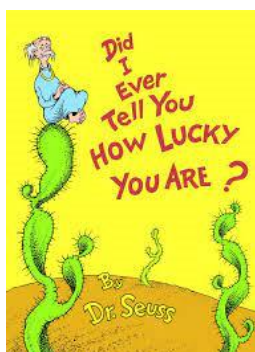
“Read Across America Week” Community School Service



Felicia B. Scott, M.S.
Senior Lecturer - Chemistry

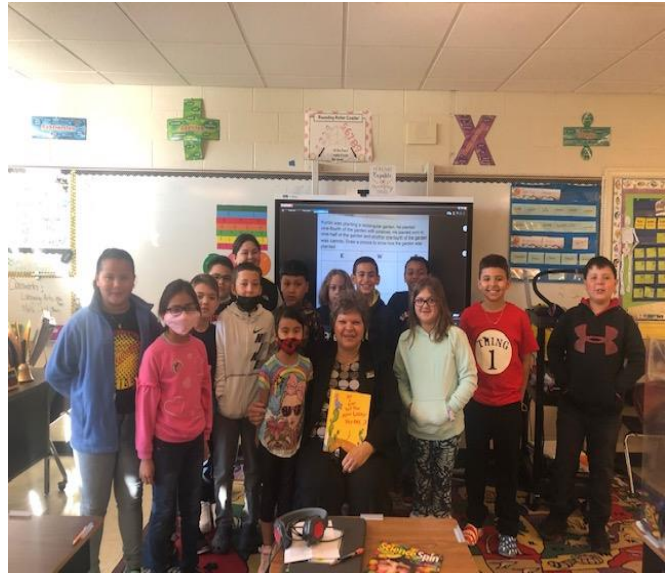
Mrs. Felicia Scott read to approximately 45 students at the Piney Grove Elementary School in Lumberton, NC for “Read Across America Week” on March 2, 2022.

The title of the book is “*Did I Ever Tell You How Lucky You Are*” by Theodor Geisel under the pen name Dr. Seuss. The text consists of a series of descriptive poems, fictively told to an unnamed listener by a wise old man. The man describes a variety of whimsically wretched characters and unfortunate situations, in comparison with which the listener might be considered exceptionally fortunate.



What is Read Across America Week?

The National Education Association established Read Across America Week in 1998 to promote a love of reading in school age children. National Read Across America Day falls on March 2 every year, on the birthday of iconic children's author Dr. Seuss.



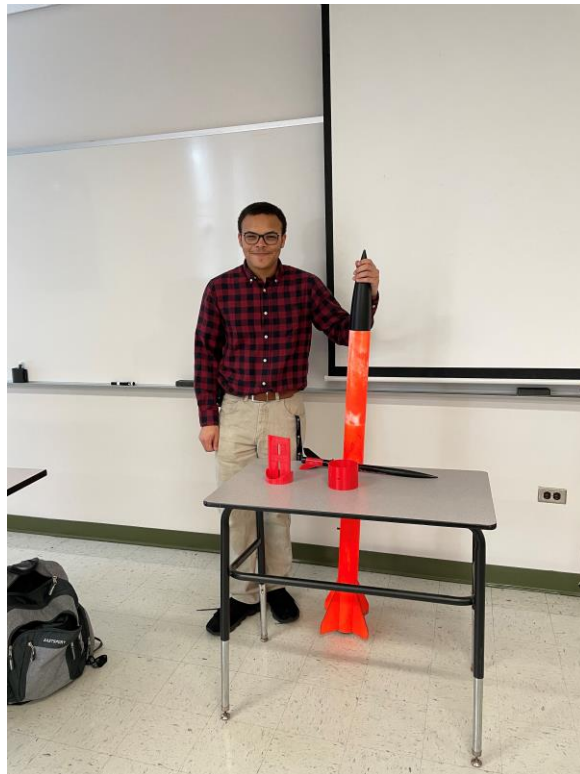
Early College Programs

On behalf of the Office of Undergraduate Admissions, Mrs. Mary Beth Locklear, (Office for Regional Initiatives) would like to say a big THANK YOU for presenting to our campus tour group on Tuesday, March 8, 2022 in the Business Administration Building!

The presentations were the highlight of the day! The students thoroughly enjoyed learning about brain functions, indigenous NC plants, rocket launches, and student success stories.

Caleb Locklear (instructor: Dr. Steven Singletary) presented the Rocket Team competition – the competition goals, the team’s efforts and showed several rockets.

Dr. Siva Mandjiny (Chemistry and Physics Department) spoke about several students’ success stories. “UNCP is extremely fortunate to have faculty and students such as you at our institution – we are grateful!” stated Mrs. Locklear.



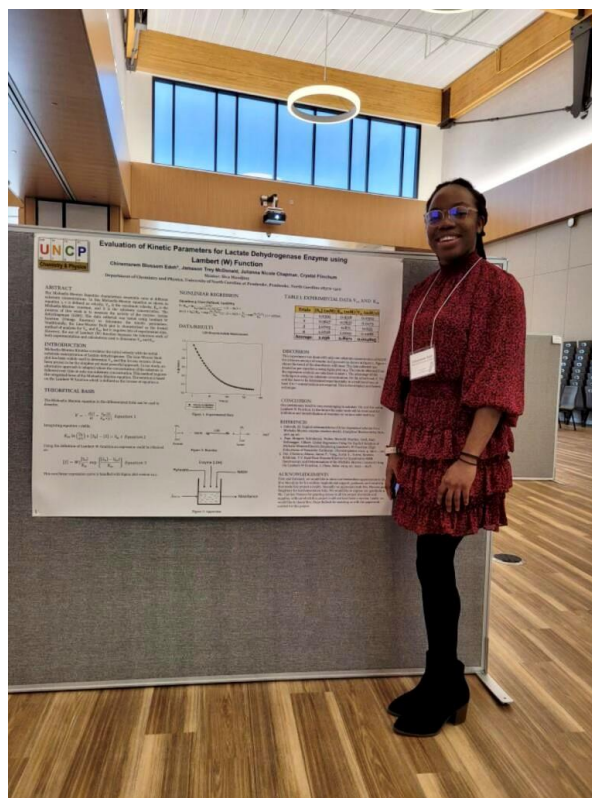
Caleb Locklear

North Carolina Academy of Science Annual Meeting



The 118th Annual Meeting of the North Carolina Academy of Science will be held hosted by Campbell University in Buies Creek, NC, March 18 -19 2022!

From UNCP, Chemistry student, Chinemerem Blossom Edoh, attended and presented the research poster: *"Evaluation of Kinetic Parameters for Lactate Dehydrogenase Enzyme Using Lambert (W) Function"* at the meeting. Name of authors for the research project are Chinemerem Blossom Edoh, Jameson Trey McDonald, Julianna Nicole Chapman, and Crystal Flinchum. Dr. Siva Mandjiny is the faculty advisor. Thank you for your inspiration to our students. Great job everyone!





Terry Chaves received first place, as determined by a panel of judges, at the NCAS Conference on March 19, 2022. Her research, carried out in the summer of 2021, along with fellow student, Shaun Schrubbe, and supervised by Dr. William Brandon (Physics), was supported by RISE.

The title of the oral presentation was: "Faraday Rotation in Air".

Name of the authors for the research project are Terry Chaves and Shaun Schrubbe.

Dr. William Brandon is the faculty advisor. Great job everyone!

NCAS Experience

Attending the 118th NCAS Annual meeting at Campbell University to present our poster "Optimization of Biological Control Agent *Bacillus thuringiensis* Growth Using 2L and 5L Fermenters Under Various Environmental Conditions" was an overall great experience. When presenting the collected data, multiple people were surprised that Bt, our soil-dwelling bacterium, was grown best at 38 degrees Celsius. Ms. Aida Cortez referred to literature that stated that Bt grew under lower temperature conditions, which was why we tested the temperatures twice but still got similar results at 38 degrees Celsius. The poster did receive good feedback and was only recommended to add more detail in the materials and methods section just in case someone wanted to replicate the experiment they could do so. Other than that, it was an excellent experience, especially for it being my first time presenting a poster. She is now excited and more prepared to present our work at the PURC Symposium this upcoming April.

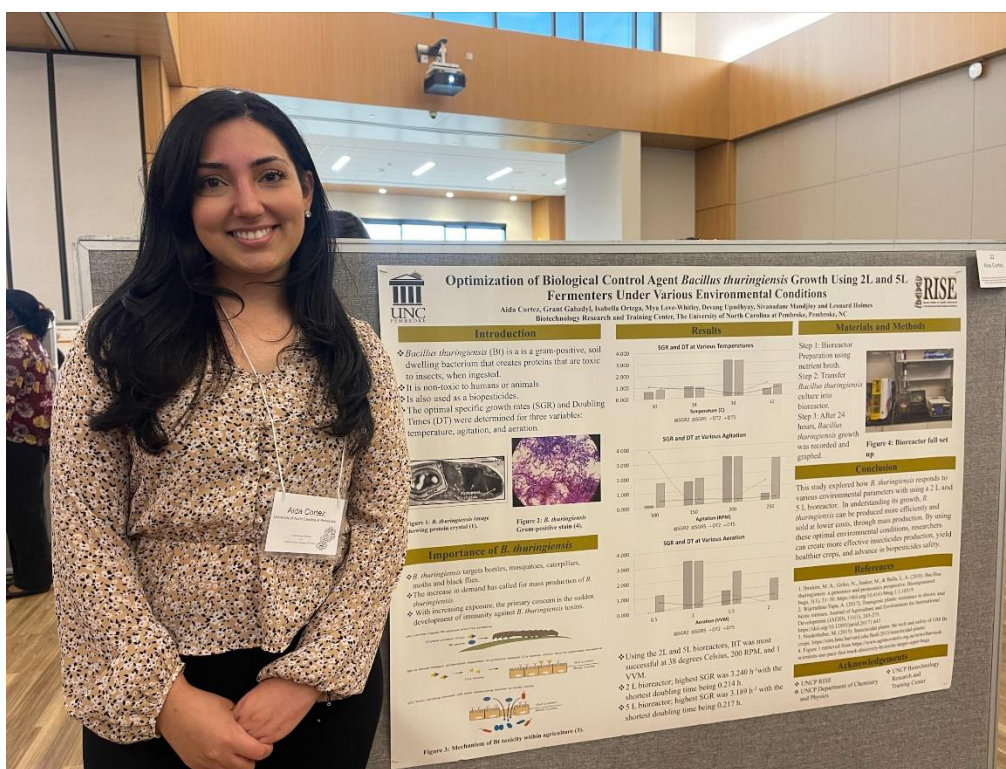
Optimization of biological control agent *Bacillus thuringiensis* growth using 2L and 5L fermenters under various environmental conditions

Aida Cortez, Grant Gabzdyl, Isabella Ortega, Mya Love-Whitley
Mentors: Devang Upadhyay, Sivanadane Mandjiny, Leonard Holmes

Abstract:

Evidence has proven that utilizing insecticides can pose a potential risk to humans and other life forms as well as unpleasant side effects to the environment. *Bacillus thuringiensis*, a distinctive bacterium naturally found in soils and plant leaves, has been accepted as a safe biopesticide to reduce these side effects. It is a gram-positive soil-dwelling bacterium that shows significant toxic effects against larvae. The goal of this study was to optimize the specific growth rate of *Bacillus thuringiensis*. This was conducted by using a 2-liter and 5-liter bioreactor. Three different growth parameters were examined which were the temperature (Celsius), agitation (RPM), and aeration (VVM). For the temperature 30, 34, 38, and 42 degrees Celsius were used. 100, 150, 200, and 250 RPM were used for agitation and for aeration 0.5, 1, 1.5, and 2 VVM were used. After conducting the experiments using variations in temperature, agitation, and airflow, the optimized specific growth rate was determined at 38 C, 200 RPM, and 1 VVM in both bioreactors.

Presented on March 18th, 2022 at the 118th NCAS Annual meeting at Campbell University



Optimization of Biological Control Agent *Bacillus thuringiensis* Growth Using 2L and 5L Fermenters Under Various Environmental Conditions

Aida Cortez, Grant Gabriel, Isabella Ortega, Mia Lavoie-Walley, Devening Upadhyay, Sivaramane Mandirajoy and Leonard Holmes
Biotechnology Research and Training Center, The University of North Carolina at Pembroke, Pembroke, NC

Introduction

- ◆ *Bacillus thuringiensis* (BT) is a gram-positive, soil-dwelling bacterium that creates proteins that are toxic to insects, when ingested.
- ◆ It is non-toxic to humans or animals.
- ◆ It is also used as a biopesticide.
- ◆ The optimal specific growth rates (SGR) and Doubling Times (DT) were determined for three variables: temperature, agitation, and aeration.

Results

SGR and DT at Various Temperatures

Temperature (°C)	SGR (1/days)	DT (min)
20	~0.001	~42
30	~0.002	~28
38	~0.003	~22

SGR and DT at Various Agitation

Agitation (RPM)	SGR (1/days)	DT (min)
100	~0.001	~42
200	~0.002	~28
300	~0.003	~22

SGR and DT at Various Aeration

Aeration (l/min)	SGR (1/days)	DT (min)
0.5	~0.001	~42
1	~0.002	~28
1.5	~0.003	~22

Materials and Methods

Step 1: Bioreactor Preparation using nutrient broth.
Step 2: Transfer *Bacillus thuringiensis* culture into bioreactor.
Step 3: After 24 hours, *Bacillus thuringiensis* growth was recorded and graphed.

Conclusion

This study explored how *B. thuringiensis* responds to various environmental parameters with using a 2 L and 5 L bioreactor. In understanding its growth, *B. thuringiensis* can be produced more efficiently and sold at lower costs, through mass production. By using these optimal environmental conditions, researchers can create more effective insecticides production, yield healthier crops, and advance in biopesticides safety.

References

1. Bealton, M. A., Gokko, N., Jensen, M., & Bulla, L. A. (2010). *Bacillus thuringiensis*: a bacterium and proteomorpho perspective. *Hydroponics and Aquaponics*, 1(1), 1-20. <https://doi.org/10.4161/hydro.11185>
2. Murakami, Y., et al. (2017). Transgenic plants: resistance to abiotic and biotic stresses. *Journal of Agricultural and Environmental Science*, 1(1), 1-15.
3. Ruckelshaus, W. (2012). *Biopesticides: Environmental and Ecological Safety*. Springer.
4. <https://www.fda.gov/oc/ohrt/biopesticides>
5. https://www.aphis.usda.gov/aphis/npw_files/biopesticides

Acknowledgements

- ◆ UNCP FINE and Physics
- ◆ UNCP Department of Chemistry
- ◆ UNCP Biotechnology Research and Training Center

Figure 4: Bioreactor full set up

New 3D Printing Capabilities



Dr. Steven Singletary, Ph.D., Clinical Assistant Professor, would like to update everyone on our new 3D printing capabilities. We have just received a new printer that can print parts in stainless steel. It can also print two different materials simultaneously. This is exciting because one of the materials can be water soluble that can be used as internal supports during printing and then easily removed. This allows us to print objects with complex internal geometries that were previously impossible on our older printers (think along the lines of closed tesla valves, reactors, mixers, etc.).

We can now print objects using a wide variety of polymers (PLA, nylon, PET-G, ABS) that can also contain various additives (carbon fiber, wood, clay, sand, marble....); photo curable resins to include deformable resins (think squishy plastic), bio-mimicing resins, etc., many of which can also contain additives such as ceramic powders which allows us to print heat resistant parts. Now we add stainless steel to the mix.

If you have any parts/equipment you are thinking about ordering for your lab work, please check with Dr. Singletary. We may be able to manufacture your parts in house. To date we've printed a variety of items for the physics labs, molds for the biology department, parts to repair our lab balances, a resonator for speed of sound experiments (which Dr. Killian has just published!), parts for the rocket team and the list grows.

Please feel free to reach out with any requests, ideas, etc.

Activities during Spring Break and March 28th

During the week of March 14-18, Mrs. Felicia Scott mentored the Riverside Christian Academy teachers and staff members on their first annual "Riverside Christian Academy Science Fair", held on March 28, 2022. Mrs. Scott visited each class to discuss with the students the difference between a science fair project and a demonstration. She explained to the teachers how to incorporate into their curriculum the scientific investigation to help their students collect, correlate, and explain each area of the project. The academy's first science fair was a success. They had approximately 30 projects from a K-12 academy with 70 students total. The students, staff and teachers had a ball.

The academy is looking forward to having their fair in the fall of 2022, to participate in the NC Region IV Science Fair at UNCP.

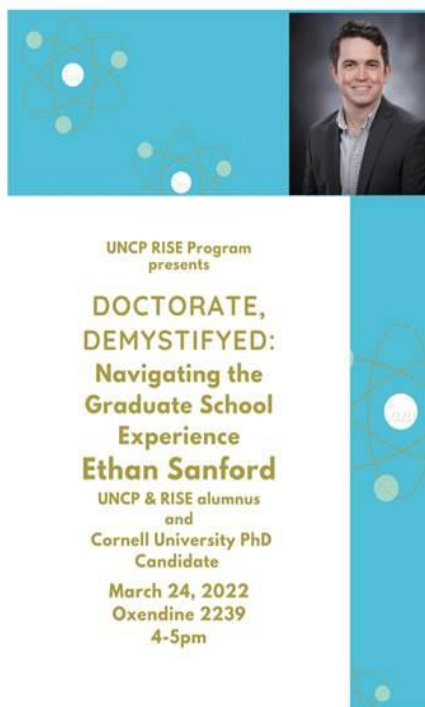






Seminar: Doctorate, Demystified! by UNCP Alum Ethan Sanford

UNCP and RISE alum (BS Biology 2016) and Cornell University PhD candidate Ethan Sanford will give a seminar entitled "Doctorate, Demystified: Navigating the Graduate School Experience" on Thursday, March 24th at 4 pm in Oxendine Science Building 2239. This seminar will outline the reasons to pursue a doctorate degree, the steps to apply and the path through the program from the perspective of a UNCP graduate. This seminar is free and open to all so please join us.



Dr. Rachel Smith, UNCP RISE Program Director

Special “thank you”, Dr. Smith, for organizing and leading this initiative.

THE NORTH CAROLINA REGION IV SCIENCE & ENGINEERING FAIR

The 2022 North Carolina Region IV Science & Engineering Fair was held virtually on Saturday, February 19, 2022. The winners for the special awards are:

Dr. Dalton Brooks Award

Gracie Elizabeth Hall – Ice, Ice Baby
\$100 cash prize

UNCP Chemistry and Physics Award

Chase Harrison Tomala - What Weakens Your WiFi?
\$50 cash prize

Great Job Students!!!



Dr. Meredith Storms completed the Tutor Match training through Fostering Great Ideas. This program is designed to help students who are in foster care to reach their full potential by providing volunteers who help to mentor them and aid with their academics. She is serving as a virtual volunteer tutor for one hour each week to tutor a foster care child (an 8th grader in South Carolina) with a focus on science, math and reading. Great job!!!



Student News

Cory Brown (BS in Applied Physics 2020): Corey will receive his MS in Electrical Engineering from UNCC (spring 2022) – right on time. Corey relayed - “Huge thanks to the whole department.”

Dana Lamberton (BS in Applied Physics 2019): Dana is our first 3+2 dual degree student. After receiving her BS in applied physics (UNCP), she completed the BS in mechanical engineering (NCSU) in the spring of 2021. Sandra began her new job as an engineer with PCB Piezotronics in February of 2022. Way to go Dana!

Sandra Huneycutt (BS in Applied Physics 2018): Sandra is currently working on Si-based solar cells fabricated with different metal contacts and using characterization techniques (e.g., SEM analysis) to understand the contact/semiconductor interface. The work is supported under two DOE projects with partnerships in New Mexico and Kentucky. Sandra’s tentative graduation for the Ph.D. in Electrical Engineering is spring 2024. Keep up the good work Sandra!