

**Infinite Possibilities: Profiles of Summer Research from
The Gatton Academy of Mathematics and Science in Kentucky**

Volume Eight - Summer 2018





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THE GATTON
ACADEMY 
of Mathematics and Science

Infinite Possibilities:
*Profiles of Summer Research from
The Gatton Academy of Mathematics and Science in Kentucky*

Volume Eight - Summer 2018

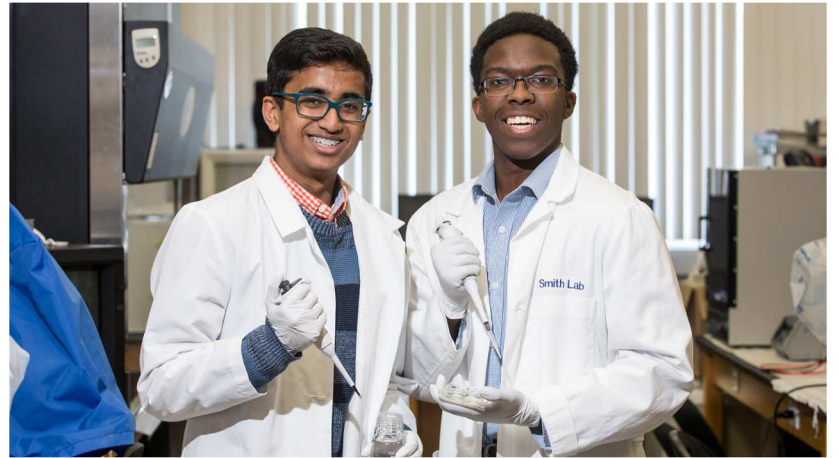


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About the Gatton Research Internship Grant Program

The Gatton Academy of Mathematics and Science in Kentucky created the Gatton Research Internship Grant in 2010. The program supports Gatton Academy students between their junior and senior years who complete summer research internships. In its first nine years, the program has created 152 research internships for Gatton Academy students to study STEM problems in their areas of interest in devoted, full-time research settings.

Each year, the research funded by the Gatton Research Internship Grant program yields significant outcomes for recipients. As examples, summer 2017 recipients of the Gatton Research Internship Grant were recognized by the Siemens Competition (Camuel Hart, Siemens national semi-finalist) and the Regeneron Science Talent Search (Emily Guernsey, Regeneron commended student). Both the Siemens Competition and the Regeneron Science Talent Search are the nation's premier competitions for high school students who conduct science research. Meanwhile, last summer's Gatton Research Internship Grants resulted in 35 student-delivered presentations at conferences across the state and nation in the 2017-18 academic year. Notably, 11 of those presentations were from Arjun Kanthawar and Nikhil Krishna's work on refining a medical mathematical model to simulate healing of diabetic foot ulcers. Benjamin Kash published the findings from his Gatton Research Internship Grant in the *New Journal of Chemistry*.

During the summer 2018, 21 rising high school seniors completed the program. The following pages feature these students.



Emily Guernsey



Camuel Hart



Arjun Kanthawar



Benjamin Kash



Nikhil Krishna

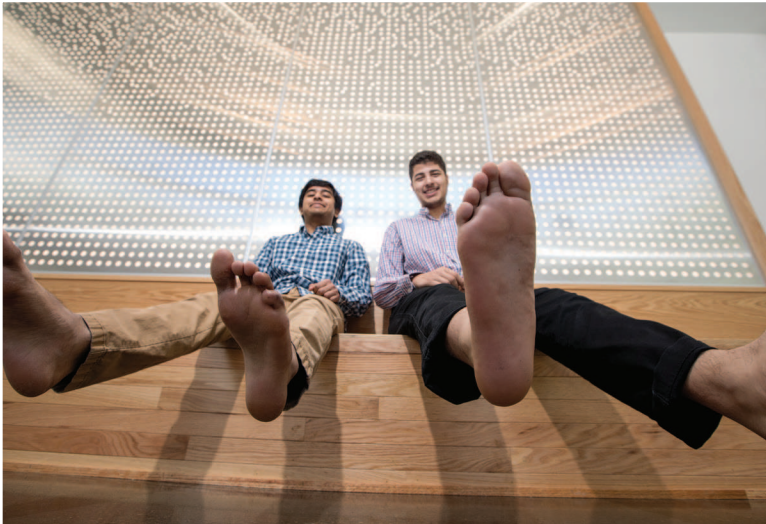
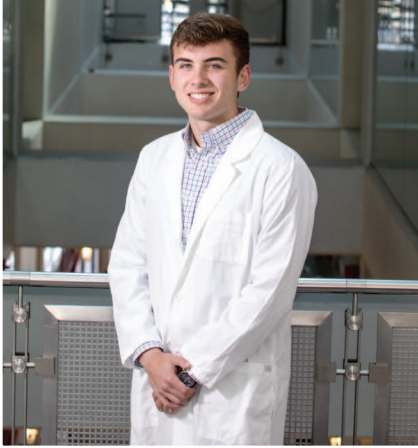


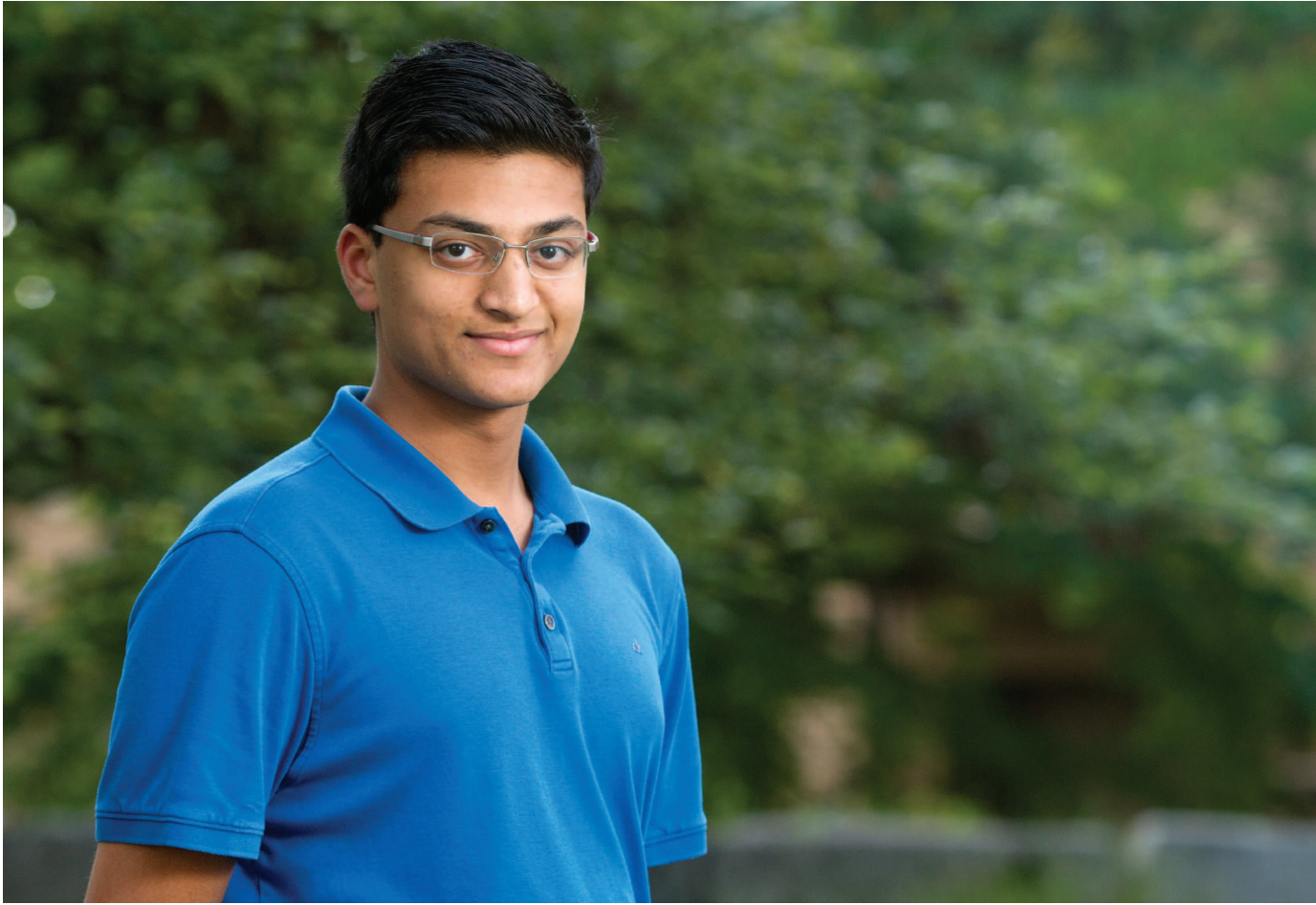
Mycobacteriophage genomes. Sleep fragmentation in mice. Self-regulation and school-readiness. *Legionella pneumophila*. Quantum potential energy curves. Twenty-one Gatton Academy students participated in faculty-mentored research on these topics and others over summer 2018. These Kentucky students pursued exceptional summer research experiences across the Commonwealth.

These summer experiences build on those offered at The Gatton Academy during the school year. Our students explore their infinite possibilities through study abroad programs, research, and the rigorous course load at Western Kentucky University, all within a community of peers. Hundreds of students, eleven graduating classes, have grown and developed in this unparalleled living and learning environment.

Our students and staff are grateful for the Commonwealth's investment in remarkable Kentucky students. As they continue to grow and develop as leaders and experts, they are sure to continue contributing to Kentucky and beyond.

With deepest gratitude,
Lynette Breedlove, Ph.D.
Director





Pranay Agrawal
Lexington, Kentucky (Fayette County)

If you told me five years ago that I would be spending my summer doing research, I would have said you were crazy. With Gatton, however, this once-thought-of impossibility has become a dream come true. This summer, I had the opportunity to conduct research on machine learning for the game Dots-and-Boxes. I became interested in artificial intelligence (AI) during my first semester of Gatton and knew I wanted to continue to explore this path. I talked to a professor with similar interests and worked on a project during my second semester. I was so inspired by the research that I then applied for the Gatton Research Internship Grant. Now I work on a project that I designed and programmed with my mentor's guidance. In my time here, I have already gained valuable experience in developing and testing an AI, learned how to write for scientific publications, and become friends with some very helpful undergraduates.

From solving difficult questions to meeting new minds to discussing future implementations of my work, this school year has given me the opportunity to grow as a person. It has helped me understand what research consists of and has helped me identify the occupation I want to pursue. Looking into the future, I cannot wait to continue my research while learning more about AI through an undergraduate course next semester. I am grateful my RIG has given me the opportunity to experience real research, explore my interests, and begin my journey on my path to becoming a scientist.

Sincerely,
Pranay Agrawal

Pranay Agrawal

Home High School:

Paul Laurence Dunbar High School

Research Area:

Computer Science

Career Goal:

Software Developer for Artificial Intelligence

Research Mentor:

Dr. Uta Ziegler
WKU Department of Mathematics

Extracurricular Activities:

Gatton Academy Leaders in Education, Robotics Club, CryptoCurrency Club, Beta Club, Gatton Student Y Chapter, and Venture Club

“The biggest challenge that I have had to overcome was attempting to understand my project. As I began my research, artificial intelligence sounded very intriguing but intimidating. With my mentor’s support, I am now able to achieve more than I could have ever thought, and that confidence has helped me grow as a person.”

“The best advice that my mentor has given me over the course of the semester is to ask questions. Without asking questions and blindly agreeing with your mentor, not only might you overlook a trivial solution or problem, but you might also inhibit yourself from learning.”

“In the coming ten years, I hope to work in the field of artificial intelligence. Being able to perform research at such a young age is a great opportunity that will aid my future career.”







Abdullah Ateyah
Frankfort, Kentucky (Franklin County)

The summer RIG has opened up a whole new world for me. The field of computational biology has allowed me to merge many of my academic passions, including mathematics, computer science, and real-world applications. It has also allowed me to expand my knowledge base and bring something new to the table of analytical math applications. Along with the amazing academic experience, I have learned many skills that will help me in my future. I have learned about money management, persistence, time management, and the most important one of all – patience.

There were times during my research that things were not looking up, and it did not seem like we were going to be able to finish or get the results that we wanted. Instead of throwing in the towel at that point, my professor, my partner, and I did not give up. Instead, we continued to try new things and proofread our programs. As we continued to work, our progress and results looked better and better, and in the end, we produced a great, presentable project. Although my first experience in a long-term research project was a bit of a roller coaster, I have enjoyed every bit of it.

Research has introduced me to something I enjoy doing, and I am seriously considering it as a career choice. This opportunity has not only allowed me to have a fun and eventful summer, it has also inspired me to pursue my love of research in the future.

Sincerely,
Abdullah Ateyeh

Abdullah Ateyeh

Home High School:

Western Hills High School

Research Area:

Computational Biology, Mathematics

Career Goal:

A career in Math with a twist of
Computer Science

Research Mentor:

Dr. Richard Schugart
WKU Department of Mathematics

Extracurricular Activities:

American Regional Mathematics
League, Soccer, Beta Club, Academic
Team, Robotics, CryptoCurrency
Club, Intramural Sports, and
Venture Club

“During my first year at Gatton, I pursued two research projects. My first one was mobile app development with Dr. Wang, and my second one (and current RIG) is mathematical modeling of wound healing with Dr. Schugart. Throughout both projects, I learned that a mixture of pure math and computer science is the field that I love and want to pursue.”

“On the first day of the Academy, I felt super excited and nervous. I wasn’t sure what type of people were going to be in my class and who would become my friends for the years to come. Everyone at Gatton is absolutely amazing in their own way, and I had nothing to worry about. Now, I feel comfortable talking to anyone I see on campus from Gatton, and I just love the atmosphere that it creates.”

“If you’re willing to work hard and pursue your dreams, Gatton will help tremendously in allowing you to do those things, all while allowing you to have the most fun you’ve ever had doing the things you love.”







Annika Avula
Bowling Green, Kentucky (Warren County)

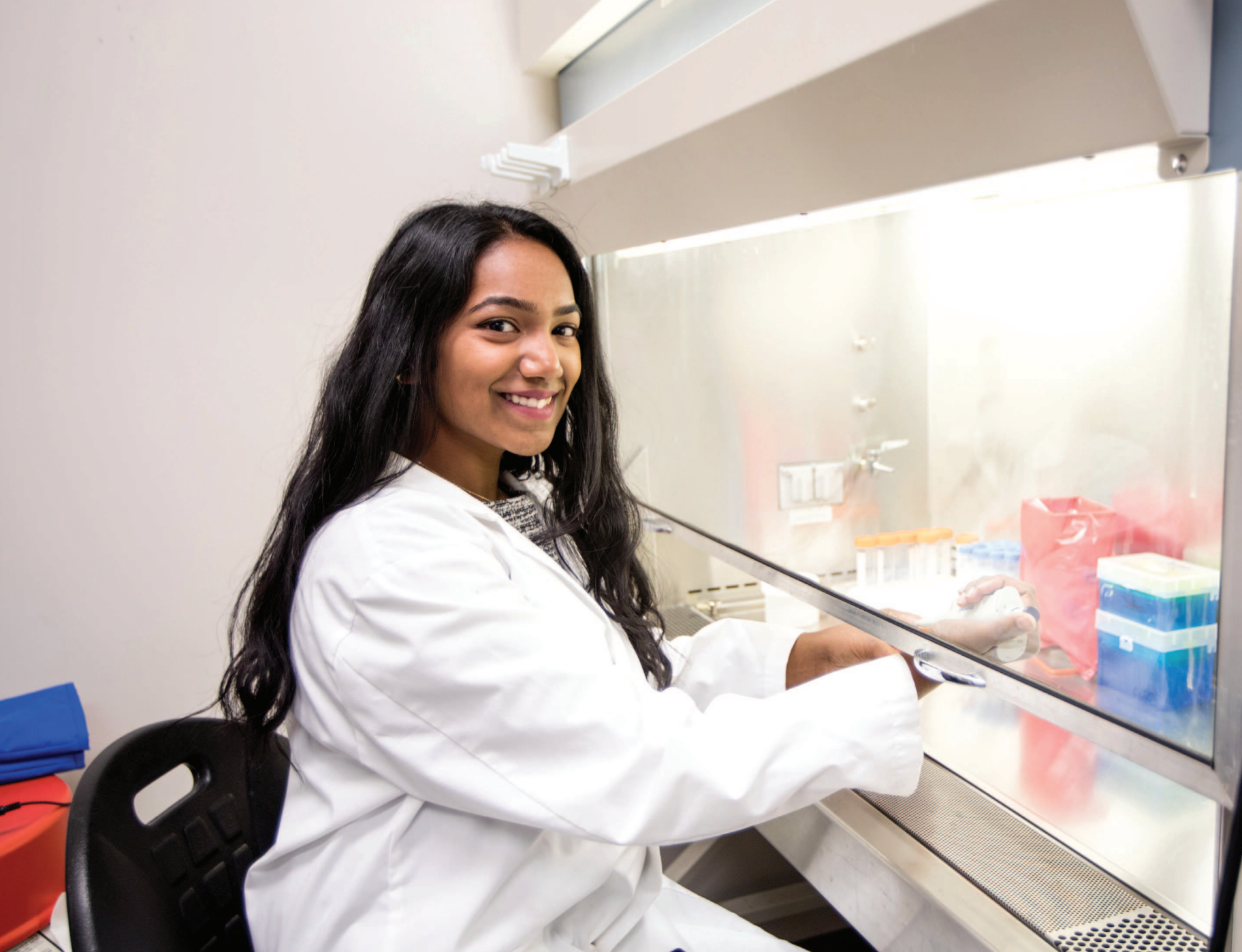
From the bottom of my heart, I just want to say thank you. The Gatton Academy is a space where we are given limitless opportunities to prove our worth and gain valuable skills for the future. These opportunities serve as a reminder of the responsibility I have to do my best, because I have been given a gift that cannot be wasted.


This summer, I began work on a project at WKU under the mentorship of Dr. Simran Banga in the Department of Biology. We are working with *Legionella pneumophila*, which grows in the free-living amoeba *Acanthamoeba castellanii*. We are trying to inhibit the growth of *L. pneumophila* by using giant viruses, which also grow in amoeba. By using giant viruses to check the growth of *L. pneumophila*, we can implement these viruses as a biological control in places where *L. pneumophila* is most likely to grow. *L. pneumophila* causes Legionnaires' disease, which is a severe form of pneumonia. With this grant, we are working to limit its growth and virulence.

Working in a lab has given me invaluable experiences I will use in the future during undergraduate research and beyond. Research is a skill that can be tricky to master, with its specificity and aspirations of perfection. You can never be too precise in the lab, but I guess that is what I love about it. The possibility of solving the world's problems using novel techniques and detailed work is so interesting, and it has only fueled my enthusiasm to contribute to the healthcare community.

The Gatton Academy has proved itself to be much more than just a school, and the gratitude I feel for it is unmatched.

Sincerely,
Annika Avula





“I am looking forward to improving my lab skills this summer and learning more about this area of biology, while working in my first real lab setting. I am also looking forward to having a full research report written by the end of the summer, both for practice and to submit to the Regeneron Science Talent Search.”

“Ever since I participated in a cancer research program the summer after my sophomore year, research that has a direct link to healthcare has always been fascinating to me. In the future, I hope to continue doing biology and cancer research so that I may someday make a difference in the scientific and healthcare community.”

“My favorite Gatton Academy memory to date would have to be one night during GROWeek when we ceremoniously ran through the fountain by the library. It was a momentous way to start the year and helped me start many new friendships.”

Annika Avula

Home High School:

Bowling Green High School

Research Area:

Biology

Career Goal:

Doctor

Research Mentor:

Dr. Simran Banga

WKU Department of Biology

Extracurricular Activities:

Future Business Leaders of America, Kentucky Youth Assembly, Kentucky United Nations Assembly, Beta Club, Circle K Club, and Community Service



Isabel Chumbler
Bowling Green, Kentucky (Warren County)

My name is Isabel Chumbler, and I am from Bowling Green. I moved to Bowling Green three years ago from Athens, Georgia, and from the second I found out about The Gatton Academy, I knew I wanted to attend. I was fascinated by all the opportunities The Gatton Academy had to offer, and I was thrilled about the possibility of living alongside like-minded individuals. I started my Gatton Academy application as soon as I could and getting in brought me infinite joy. The Gatton Academy is my happy place; a place where I know I will thrive, and a place where I get to watch those I love thrive.

Research has been a critical part of my Gatton experience, and I have been involved in the same project since the first semester of my junior year. I am conducting research with Dr. Cathleen Webb in WKU's Department of Chemistry, analyzing the mercury in bat fur from Mammoth Cave National Park. The Research Internship Grant gave me time to build upon my project and analyze more samples. The data I have found this summer will hopefully be published in the spring of 2019.

Being involved in research has given me unparalleled experience and independence that I will utilize for the rest of my life. As a young person interested in STEM, research is an integral part of my life. I want to enter a career in chemical engineering with an emphasis on the environment, and this summer's project aligns perfectly with my future research interests.

Best regards,
Isabel Chumbler

Isabel Chumblor

Home High School:

Bowling Green High School

Research Area:

Chemistry

Career Goal:

Chemical Engineer

Research Mentor:

Dr. Cathleen Webb

WKU Department of Chemistry

Extracurricular Activities:

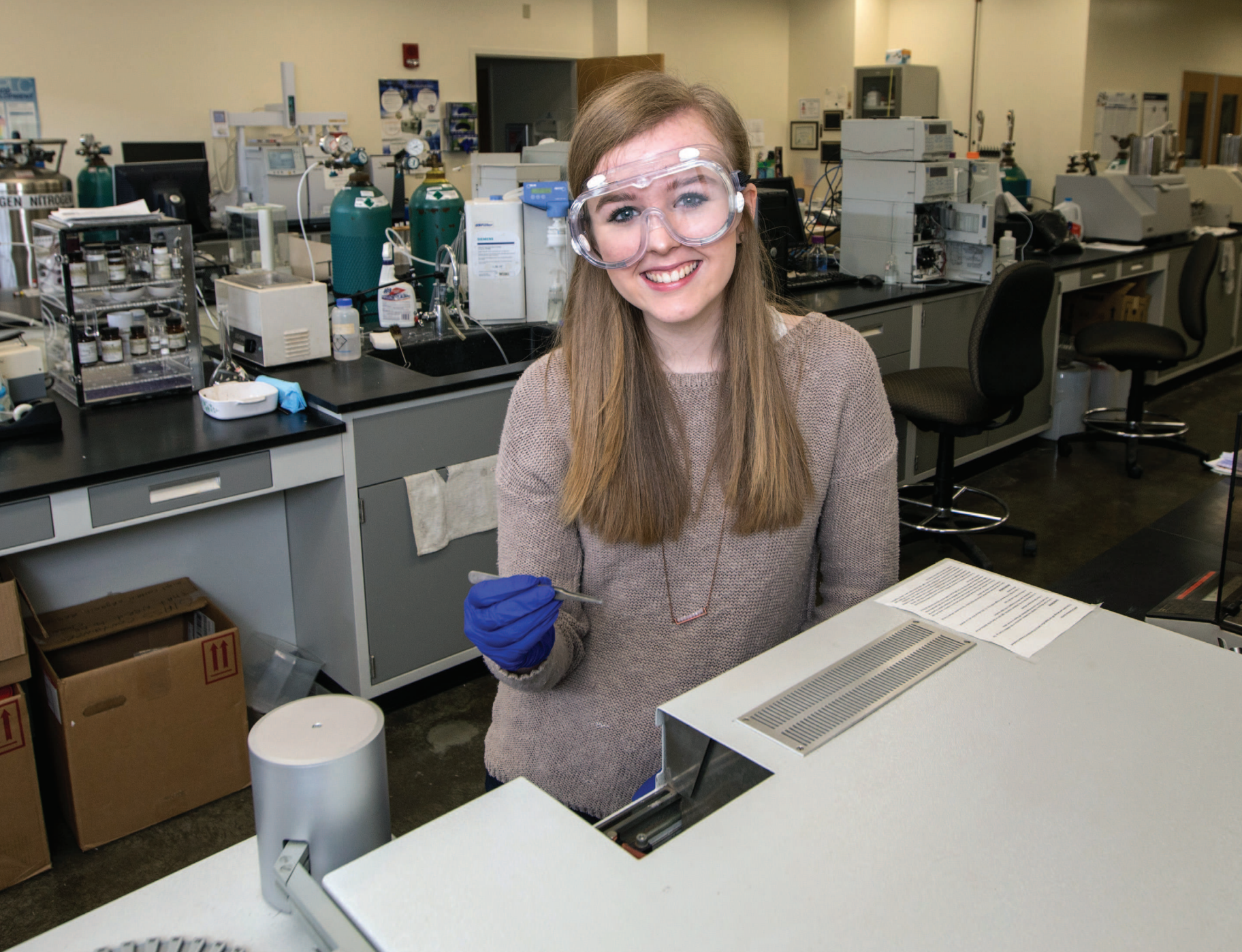
Gatton Academy Leaders in Education, Gatton Student Y Chapter, Beta Club, Peer Tutoring, and Volunteer Work

“For eight weeks, I will be researching the mercury levels of bat hair from Mammoth Cave National Park. I am extremely fascinated with my project and am overjoyed to have summer research under my belt. Having this research will help me further progress in my project, while also helping me gain critical lab experience and a newfound independence.”

“My biggest accomplishment at The Gatton Academy is presenting my research at WKU’s REACH Week. With it being my first research presentation, it gave me phenomenal experience in the realm of research conferences.”

“I will be using my research experience to apply for the Regeneron Science Talent Search, which leads to a multitude of great opportunities, broadening my research perspective. The process of applying is eye-opening in itself, helping me to process the research data and allowing me to see its significance and impact.”







Elizabeth Embry
Guston, Kentucky (Meade County)

My name is Elizabeth Embry, and I am from Meade County, Kentucky. Before I came to Bowling Green to attend the Academy, I never left home. I grew up in a very small, rural county where going to our high school's football game was everyone's plan on Friday night and driving to Indiana for a movie now and then was a major event. Now that I am here, I have gotten to experience more than I ever imagined. Traveling abroad to Costa Rica and participating in summer research have been two of the most amazing and educational experiences I have ever had.

I am currently participating in a research internship on Western Kentucky University's campus. I am looking into the catalytic performance of nanorods that have been synthesized in Ionic Liquids. This research has opened opportunities for me and my academic goals, as I want to pursue chemical engineering as my profession. My father is an electrical engineer who graduated from the University of Kentucky and following in his footsteps as an engineer has always been a dream of mine. The Gatton Academy has allowed me to explore my passion for chemistry.

I would not be who I am without my school and the people I have met from all around the world.

Thank you for everything,

Elizabeth Embry

Elizabeth Embry

Home High School:

Meade County High School

Research Area:

Chemistry

Career Goal:

Chemical Engineer

Research Mentor:

Dr. Lawrence Hill

WKU Department of Chemistry

Extracurricular Activities:

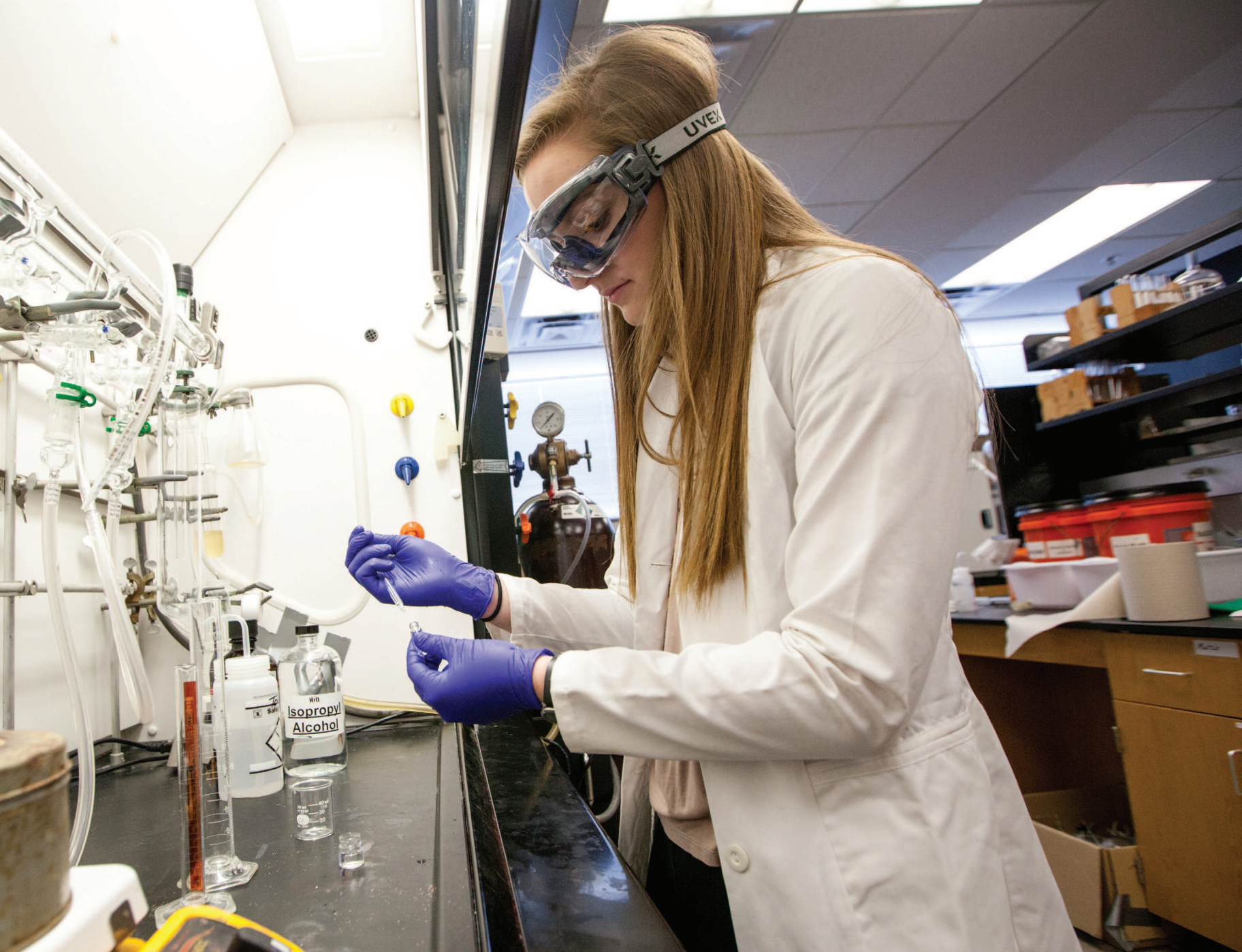
Gatton Student Y Club, Future
Business Leaders of America, and
Chemistry Club

“I am looking forward to being able to dive deeper into a subject that I really enjoy learning about the most. Conducting research as a 17-year-old female empowers me to show the world that even as a young woman, I am capable of extraordinary accomplishments.”

“The Gatton Academy has broken the stigma attached to Kentucky about our education values and academic aspirations by showing how young people care about their education and care about becoming better, not only for themselves, but for their communities.”

“I think the relationship that I have with my parents has changed the most in the past year. When I was in high school, I never really discussed high school or my grades because my parents knew that they were above average. Now, I call them when I get above the class average on a test. I’ve gotten closer to them, and I know I wouldn’t be as successful as I am without them.”







Anas Gondal
Danville, Kentucky (Boyle County)

Coming to Gatton was the hardest decision I have ever made. I have lived in Kentucky for five years, and I am proud to be part of Danville. Even so, I have not been able to shake off the feeling of being new since moving here. As one of three Muslim boys in my hometown, I felt I had to prove myself constantly to people who had never met me. My parents reminded me that because of my ethnicity, I had to work to correct my peers' opinions. I took the hardest classes available, and every mistake was an opportunity to improve myself. When I could not focus on just schoolwork, I played my heart out on the tennis courts. Competition fueled me.

However, I lost many opportunities while competing. Danville High School has a very visible academic ceiling for its students, and I had no intention of stopping there. When my Dad first told me about Gatton, I knew that despite what I had in Danville, I needed Gatton to succeed; however, I would have to give up many friends and the home I have known best. Each person I talked to had a drastically different opinion of this choice, and I was not sure where I was meant to be.

Thankfully, though, I am sitting here at WKU, writing to you. At Gatton, I had nothing to prove to the diverse and brilliant student body. I am extremely grateful to learn from mentors who are passionate about their fields of study and who conduct cutting-edge research. At Gatton, I have found my home, and I could not be more grateful.

Sincerely,
Anas Gondal





“Fruit fly larvae dissections are one of the hardest things I have ever had to do in my research. Since this was fundamental to my research, I eventually learned to do it accurately and quickly, but only after almost a hundred attempts and a dozen hours spent in the lab.”

“To me research means that I am making a difference. The research I am doing is involved in relating findings in fruit fly genetics to cancer in humans. It has the potential to be used in the development of a cure for cancer. The opportunity to add to this important discovery process and work towards a cure for cancer as a 16-year-old high school junior is something I truly appreciate.”

“The Gatton Academy is the best opportunity a motivated high school student could ask for. The Academy allows students from all backgrounds around the state to come together and further their education in a way no other secondary school in the state could offer. On top of that, at the Academy students get to make lasting friendships with similarly gifted students, study abroad to expand their world view, and get access to scholarships and research opportunities previously unknown to them.”

Anas Gondal

Home High School:
Danville High School

Research Area:
Biology — Genetics

Career Goal:
Commercial or Government-Sponsored Genetics Research

Research Mentor:
Dr. Ajay Srivastava
WKU Department of Biology

Extracurricular Activities:
Department of Energy Science Bowl,
Boys and Girls Club, and Tennis Club



Gopika Gopan
Henderson, Kentucky (Henderson County)

My name is Gopika Gopan, and I am from Henderson, Kentucky. Being at The Gatton Academy has been one of the best experiences of my life. It has challenged me academically in ways that would not have been possible anywhere else. It has made me a more independent person and readied me for the future. Growing up in both a small town in Kentucky and a small town in India, these are experiences I never thought I would have. I have come to think of Gatton as a second home rather than as a school or a place of work.

I am thankful for the opportunity to do research over the summer. I am currently conducting child psychology research, testing emotional self-regulation and self-control in children ages 3-5 in hopes of predicting their school-readiness abilities. One day I hope this research and other projects like it are used to change public school systems to make them more effective for all children.

Doing research over the summer has been a memorable experience, giving me an idea of what doing true research is like and helping me understand whether it is something I would like to pursue. I enjoy my research very much and hope it will make a difference one day.

Thank you for making this possible!

Gopika Gopan





“The biggest challenge in research that I have had to overcome is finding patience. A lot of my research was taking time to craft and build experiments. That said, now it is really paying off, and I am excited to get immersed in this research and see my work come to life this summer.”

“On the first day at Gatton, I would say that I felt a sense of excitement and nervousness. Now, I view Gatton as a home and a place of familiarity. While Gatton is a huge commitment and change, the school, the community, and the opportunities it provides are worth it all.”

“Within the next ten years, I hope to be in or past medical school. If I were to finish with it, I would like to participate in the organization Doctors Without Borders.”

Gopika Gopan

Home High School:

Henderson County High School

Research Area:

Psychological Sciences

Career Goal:

Medicine

Research Mentor:

Dr. Elizabeth Lemerise

WKU Department of Psychological Sciences

Extracurricular Activities:

Study Buddies, Chemistry Club, Gay-Straight Alliance, Space Club, and Story Club



Elizabeth Hedrick
Louisville, Kentucky (Jefferson County)

My name is Izze Hedrick, a recipient of a research grant for the summer of 2018. I am from Louisville, Kentucky. I was initially drawn to The Gatton Academy because I wanted to pursue a career in physics and math and became frustrated with my home school's slow pace. The Gatton Academy has challenged me to manage my time and to think outside of the box. Spending time with friends and keeping up with classes helped me to find people who have passions similar to my own, something that was difficult to find prior to Gatton.

This summer I am conducting theoretical quantum chemistry research with Dr. Jeremy Maddox at WKU. I create potential energy curves, which are visual representations of the potential energy of a molecule as a function of bond length. Potential energy curves have many applications in chemical dynamics and can help chemists simulate bonding reactions or validate experimental results. This is my third experience in research; my first was during my freshman year in electrical engineering, and my second was during my sophomore year in botany. My research with The Gatton Academy is by far my best experience with research. My favorite part is learning to understand the algorithms used to find the energies I graph, exposing me to advanced math, physics, and chemistry that I would otherwise not learn until I was pursuing a graduate degree.

My experiences this summer have had an impact on my plans for college; I now want to pursue chemistry and physics, and possibly go into pharmacology or research. I also want to study Russian, which I have studied at The Gatton Academy through the STEM+ program, and possibly teach physics or chemistry in a Russian-speaking country. Thank you for making these and future opportunities possible with The Gatton Academy.

Sincerely,
Izze Hedrick

Elizabeth Hedrick

Home High School:

duPont Manual High School

Research Area:

Computational Chemistry

Career Goal:

Physicist at the European Organization for Nuclear Research (CERN)

Research Mentor:

Dr. Jeremy Maddox
WKU Department of Chemistry

Extracurricular Activities:

Gatton Academy Leaders in Education; Russian Club; Intramural Futsal and Soccer; and Tutoring in Chemistry, Computer Science, Physics, Russian, and Calculus

“The biggest challenge I’ve had to overcome in my research is having to learn lots of basic information before I could start applying it. My research is based on quantum mechanics and electronic structure in compounds, so I had to understand those before I could start applying the information they hold.”

“I want to be a physicist at CERN, so research in computational chemistry is a major step in my journey. I would like to use my research for competitions such as Regeneron and the Google Science Fair. I will also be looking for scholarship opportunities around my research when I start applying for college.”

“My biggest accomplishment is a class I am in right now called Web Programming. It includes seven different computer languages and subsets of computer languages to put together a challenging webpage. Getting the syntax right for every language and making the languages work together were two significant challenges.”





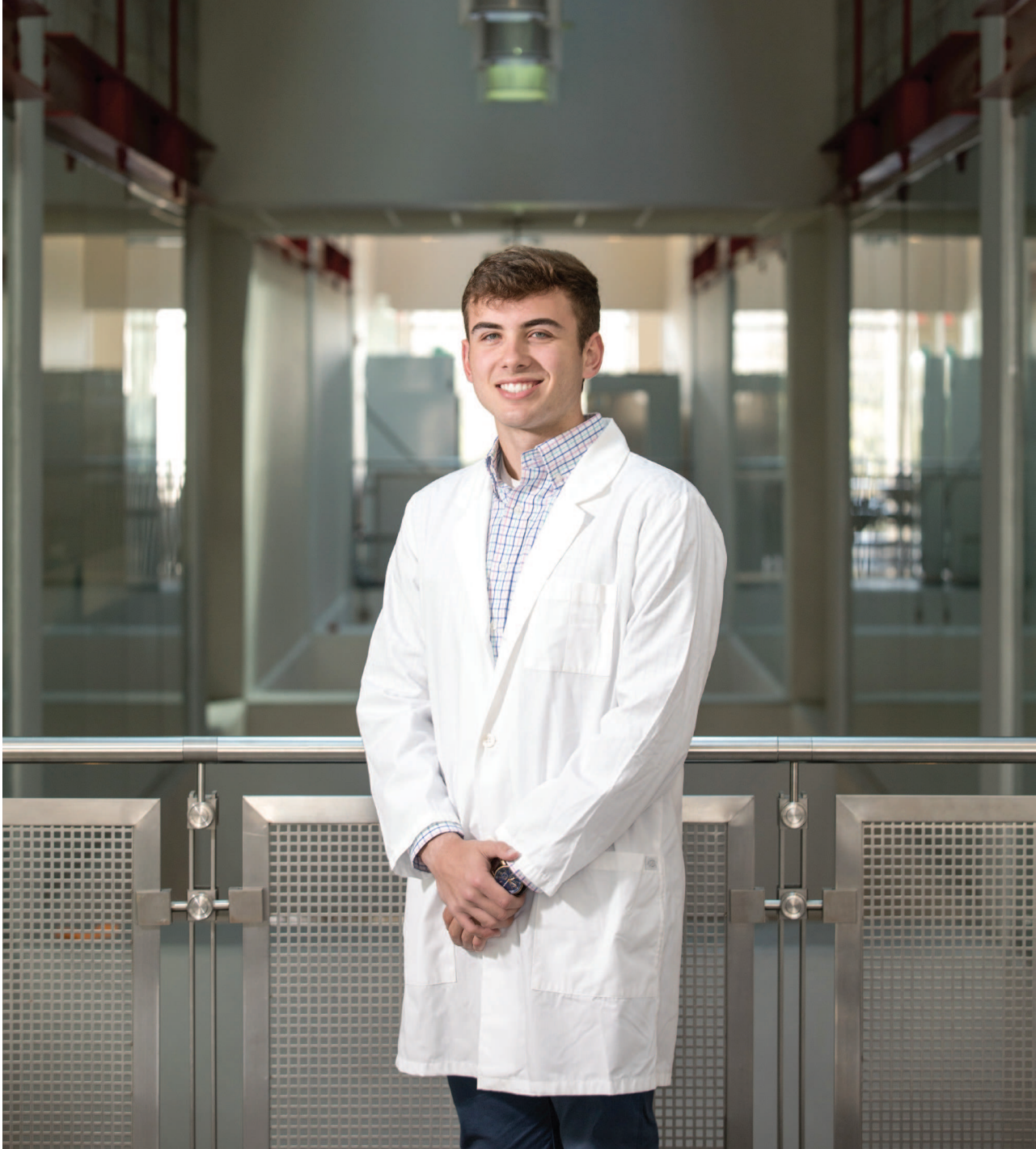


Evan Hendrickson
Mount Vernon, Kentucky (Rockcastle County)

My name is Evan Hendrickson, and I am from Mount Vernon. Being from the eastern part of the state, I always felt behind other Kentucky students, which is what primarily motivated me to apply to the Academy. The curriculum and opportunities seemed unreal. In my one year here, I have been able to deeply immerse in my interests of chemistry and biology through the many courses WKU offers, as well as through two mentored research projects.

Aside from academics, I feel I have developed so much character as an Academy student. I have faced some of the hardest challenges of my life here, but the Academy has given me the skillset to conquer them and has surrounded me with a community of amazing friends and mentors to lift me up. Without the Academy, I would not be half the student or young man that I am today. Your willingness to support education and young people makes such a difference for each Academy student, and I am eternally grateful for all you have given me and my fellow students.

Sincerely,
Evan Hendrickson



“The coolest thing about summer research is that you must find creative ways to solve issues yourself. There isn’t a textbook or protocol that will tell you exactly what to do in certain situations; research is much more complex than that.”

“At first glance, my research may not appear to be even remotely related to my goal of becoming an OB/GYN. However, by studying the bioaccumulation of methylmercury in bald eagle organ tissues, I am gaining a better understanding of how natural toxins transfer among organisms, including humans. This project will give me a skill set that will help me streamline into future undergraduate environmental/biological research projects.”

“Coming from a small, underserved community in Appalachian Kentucky, the Academy has provided me with opportunities I didn’t even realize were possible. Being able to pursue STEM research, advanced college curricula, nationally competitive programs and scholarships, study abroad, and live in a community alongside Kentucky’s brightest students, the Academy sets its students on a path of success.”

Evan Hendrickson

Home High School:

Rockcastle County High School

Research Area:

Chemistry

Career Goal:

Obstetrician-Gynecologist

Research Mentor:

Dr. Cathleen Webb
WKU Department of Chemistry

Extracurricular Activities:

Gatton Student Y Chapter, Gatton Academy Leaders in Education, Gatton Academy Medical Association, Circle K Club, and Future Business Leaders of America



Elvin Irihamye
Lexington, Kentucky (Fayette County)

Thank you for enabling me to pursue the goals and aspirations I have been dreaming of since I was a little kid. Growing up I had always wanted to pursue the sciences, hoping to positively impact others around me and maybe even extend our understanding of science and medicine. As a middle school student, I was fortunate to have an older sibling who attended the Academy. I witnessed her transform from a shy and unsure kid to a confident and ambitious young adult ready to take on the world. Watching her change as she went through The Gattton Academy made me even more anxious to attend and take on the same challenges. Coming from Lexington, opportunities to succeed academically were always present, but being at The Gattton Academy has given me so much more of an immersive and wholesome experience.

After talking to several professors this past year, I decided to work in the neurobiology lab of Dr. Michael Smith for both the school year and the summer. I began learning zebrafish microdissection techniques in order to observe how certain chemotherapy drugs can induce hearing loss. After a few training sessions, I was left to practice independently, and suddenly I was in charge of my own development. Learning to balance research, my social life, and studies became a challenge I had to work hard on to keep in check. Being in the lab over the summer has allowed me to throw myself into research, dealing with scientific problems of all shapes and sizes. I truly feel as if research is an important part of my academic satisfaction and having this experience has confirmed my desire to continue to pursue research beyond the Academy.

Thank you for your ongoing support and this opportunity.

Sincerely,
Elvin Irihamye



“The biggest challenge I’ve had to overcome in my research is learning to conduct micro-dissections on extremely small structures. Because the nature of my research is tedious and physically demanding, I’ve learned to be patient and calm.”

“I plan to use my research experience to help elevate my application for the Goldwater Scholarship, the peak of undergraduate research recognition. In addition, I plan to use my experience to apply to several scholarships including Coke Scholars, Davidson Fellow Scholars, and the Elks National Foundation Scholarship program.”

“In ten years, I aspire to have several published papers and a residency spot at an academic medical center. I also hope to go back to my parents’ home country of Rwanda and help improve the medical services system.”

Elvin Irihamye

Home High School:

Paul Laurence Dunbar High School

Research Area:

Neurobiology/Genetics

Career Goal:

Surgeon

Research Mentor:

Dr. Michael Smith

WKU Department of Biology

Extracurricular Activities:

Gatton Academy Medical Association, Future Healthcare Professionals, Gatton Student Y Chapter, Debate Team, CryptoCurrency Club, and Coding Club



Matthew Knerr
Paducah, Kentucky (McCracken County)

I am a rising senior from Paducah, Kentucky. Going from a school of 2,000 students to one with 200 has been a difficult adjustment, but I have enjoyed every moment of my time at The Gatton Academy. I hope to graduate from Gatton with honors and eventually pursue a pre-medicine track with a dual major in biochemistry and neuroscience, ultimately becoming a neurosurgeon. I applied to The Gatton Academy for its challenging curriculum and the opportunities that come with it, and it has surpassed all expectations.

The Research Internship Grant offers even more than can be attained during the four regular semesters. It presents the chance to conduct research in a subject I am truly interested in. I am researching the effects of 24-hour light on the circadian rhythms of zebra finches. More specifically, I am performing brain surgeries, collecting tissue samples, and analyzing gene expression values in biomarkers that determine mating, social lives, and neurogenesis to determine if constant light affects the normal oscillations of these biomarkers. This is an opportunity to practice surgery and to determine if this field is something I can truly see myself doing as a career. It also allows me to begin my Gatton research career and develop a relationship with a renowned professor, Dr. Noah Ashley. I hope to continue research with him in the future and eventually present and publish our findings beyond the competitions I plan on entering.

Sincerely,
Matthew Knerr





“This research experience is a huge step for my undergraduate application process for pre-med programs. Hopefully this will make me a more competitive medical school applicant. Furthermore, I’m trying to find research that I truly enjoy doing, and this could be a great fit.”

“In the next 10 years I’d like to make it into a fantastic neuro/bio-based college with a high medical school admission rate. Next, I’d like to study abroad for at least a year, preferably in Europe. Then, I hope to get accepted into medical school and make a top-10 neurosurgery residency. Eventually, I’d like to start my own practice.”

“In the coming year, I’m looking forward to developing relationships with my professors and classmates, as well as getting to meet the juniors. Second semester of senior year will be almost entirely courses that I want to take, which might be what I’m looking forward to most.”

Matthew Knerr

Home High School:
McCracken County High School

Research Area:
Biology

Career Goal:
Neurosurgeon

Research Mentor:
Dr. Noah Ashley
WKU Department of Biology

Extracurricular Activities:
Space Club, Gatton Student Y
Chapter, Venture Club, and Future
Healthcare Professionals



Trivan Menezes
La Grange, Kentucky (Oldham County)

The night my Academy acceptance email arrived in my inbox is forever engraved in my mind. As I was celebrating, my father looked at me and stated, “One generation is all it took.” What he meant was that it only took one generation after his—the one that kick-started my family’s life in the United States—for a member of our family to be on track to receive an education from an elite school. Both of my parents are immigrants. They came to the U.S. from Brazil and Indonesia in search of better lives. On multiple occasions, my grandmother mentioned how much it meant to her that I possessed such a strong desire to learn and push my academic potential. She was always obsessed with learning, but was never given the chance to pursue a formal education. Because of the opportunity you have helped provide, I am on track to pursue a dream that was impossible for my immediate family.

At the moment, I am passionate about mathematics and computer science. My time at Gatton has increased my love for these fields, and it has also opened doors that I would not have dreamt of. One of these doors is the Research Internship Grant. My research is within mathematics, but my project utilizes computer science principles to develop algorithms. The grant has allowed me to further progress in my research project while providing me with a platform to develop my skills as a mathematician and computer scientist. I cannot be thankful enough for the opportunity I have been given in terms of my time at the Academy.

Sincerely,
Trivan Menezes

Trivan Menezes

Home High School:

Oldham County High School

Research Area:

Mathematics

Career Goal:

Undecided

Research Mentor:

Dr. Claus Ernst

WKU Department of Mathematics

Extracurricular Activities:

Gatton Academy Leaders in Education, Film Club, Gatton Student Y Chapter, and WKU Soccer (practice player)

“My biggest Gatton Academy accomplishment thus far is presenting my research. After working on my project for a few months, I was able to present my project at the annual meeting for the Mathematical Association of America – Kentucky Section. Presenting in front of top professionals in mathematics is something I would not have anticipated doing prior to coming to The Gatton Academy.”

“Mathematics research can feel quite abstract at times. I once asked my mentor about the purpose of one of his projects. He responded, ‘Why do people climb Mount Everest? To do it!’ In numerous areas of research, a project’s direct application may be unclear. That said, such projects may have the capacity to change the world in the future.”

“Not only will my research provide me with experience invaluable to my future as a scientist, it will also provide me with the resources necessary to apply for scholarships such as the Davidson Fellows Scholarship.”







Lea Mitchell
Hebron, Kentucky (Boone County)

This summer I have been researching water quality in Bowling Green. Throughout my project there have been many obstacles and issues to overcome. Deciding on a research project was actually quite difficult when so many ideas were possible. After deciding the path I would take, adventures from kayaking to volunteering took place. I battled mosquitoes, got eaten alive by chiggers, and had a couple near death experiences, but I finished every day with a smile. The research I am doing has been full of challenges, but it has given me goals for myself and my future. I never would have had these goals if it were not for The Gatton Academy, STEM+, and the WKU Sisterhood Research Internship Grant.

The Gatton Academy has given me the chance to figure out who I am. Through STEM+ I am learning Chinese with the Department of Modern Languages, and the summer research internship grant has allowed me to cement my love for geochemistry and hydrogeology. I now know that I would like to continue my ecology research through the rest of my time at WKU, and I hope to do something similar later in life. When I am finished with my education, I hope to conduct research on water quality in China, as well as other places.

Thanks to you, the opportunity I had this summer has shown me what I really enjoy and the future I would like to have. I would like to sincerely thank you for the chance you gave me this summer and the difference you have made in my life. I was able to both grow as a person and a scientist due to your generosity.

Thank you,
Lea Mitchell





“My research fits into my educational and professional goals because it is helping me decide what my goals are. Creating my research proposal gave me an idea of what I want to do in the future.”

“My favorite memory while attending The Gatton Academy was my trip to China. I am a STEM+ Chinese student and being able to experience the culture was extraordinary. I was able to improve my Chinese speaking and make unforgettable memories.”

“On my first day at Gatton, I felt nervous and excited. At the time, I didn’t know what I was going to be able to do or achieve. From the second day onward, I have been thankful and excited. My journey has been lots of fun, and I can’t wait to see what else is going to happen.”

Lea Mitchell

Home High School:
Conner High School

Research Area:
Environmental Science

Career Goal:
Most likely in a lab or fieldwork on water quality

Research Mentor:
Dr. Jason Polk
WKU Department of Geography and Geology

Extracurricular Activities:
Gay-Straight Alliance, Gatton Academy Leaders in Education, Envirothon, Girl Scouts, 4H, and WKU Queer Student Union



Satya Moolani
Owensboro, Kentucky (Daviness County)

I am honored to be one of the recipients of the Gatton Research Internship Grant. Growing up in Owensboro, where academic challenges are available, helped me realize the value of a rigorous education. Learning about the Academy in 2014, when my brother attended, I could not wait to apply. Watching my brother adapt to his new environment, I instantly knew that with his help, I would be able to fully utilize the resources that the Academy provided, one being undergraduate research opportunities at WKU.

I began my research in late March and can say that it started off as an unexpected challenge. From not being able to understand the anatomy of zebrafish to fully dissecting them and interpreting data and graphs about the hair cells in the inner ear was intense. Since this was my first research experience, I did not know how to start. Taking the initiative, I asked my research mentor many questions, and a few short months later, I can now say my research is off to a first-rate start.

This opportunity has allowed me to come one step closer to my long-term goal of heading into the medical field. My educational and research pursuits would not be possible without The Gatton Academy. I hope one day I will be able to help other students achieve their goals just as the Academy has helped me.

Sincerely,
Satya Moolani





“The biggest challenge that I overcame in my research is learning how to dissect the inner ear of zebrafish. After dissecting the inner ear, we have to trim the saccules and utricles so that the sensory hair cells are the only visible parts of the dissection.”

“I, along with Elvin Irihamye, plan to present our research at many research conferences. We also plan on submitting our 18-page research paper to the Regeneron Talent Search, along with other research competitions. My final goal is to start the process for publishing a paper in a scientific journal.”

“Research has made me realize that biology-related work is what I want to continue for the next few years of my life.”

Satya Moolani

Home High School:

Daviess County High School

Research Area:

Biology

Career Goal:

Medical Doctor

Research Mentor:

Dr. Michael Smith

WKU Department of Biology

Extracurricular Activities:

CryptoCurrency Club, Future Business Leaders of America, Stock Market Club, Gatton Student Y Chapter, Gatton Academy Medical Association, Intramural Basketball and Soccer, Gatton Academy Leaders in Education, Research, and Tennis Club



Rithik Reddy
Bowling Green, Kentucky (Warren County)

Since I was a young boy, I have had a deep curiosity about the world. I wanted to explore and understand how everything around me worked. As I grew older, this curiosity only deepened. Because of this curiosity, I decided to apply to and ultimately received an invitation to attend The Gatton Academy.

Since attending the Academy, I have changed so much in one short year. I have been able to explore many different aspects of education, one being WKU classes. Students are not only welcome to dive deeper into their existing interests, but also encouraged to explore classes they previously have not been exposed.

Another aspect I have been able to explore is research. Before Gatton, I imagined that research was only done by professionals, but since this spring, I have been conducting research with Dr. Richard Schugart in the WKU Department of Mathematics, where we are refining a mathematical model for wound healing. Conducting research has exposed me to many different ways of thinking, and I am grateful for yet another way to explore my curiosity of the world. Because of these experiences, I knew I wanted to pursue research further, so I decided to apply for a RIG. Twenty other students and I have been able to pursue our goals in research, gaining invaluable experience.

Choosing to attend The Gatton Academy has been one of the best decisions of my life.

Sincerely,
Rithik Reddy





“My mentor described our research as ‘looking for a needle in a haystack,’ as in trying to find the best approach to move forward with the problem. This statement stood out to me because I want to be challenged and always look for novel ways to solve problems, both educationally and professionally.”

“In my second year at The Gatton Academy, I am most looking forward to diving further into my interests, but also to take classes in and explore other topics.”

“I would tell other Kentucky high school students that if they are interested and/or passionate about math and science, they should definitely apply to The Gatton Academy. Applying and then choosing to come to Gatton was truly one of the best decisions of my life, and I am very glad I am here.”

Rithik Reddy

Home High School:

Bowling Green High School

Research Area:

Mathematics/Computational Biology

Career Goal:

Undecided

Research Mentor:

Dr. Richard Schugart

WKU Department of Mathematics

Extracurricular Activities:

Academic Team, Beta Club,
Gatton Student Y Chapter, and
CryptoCurrency Club



Wyatt Ringo
Louisville, Kentucky (Jefferson County)

My name is Wyatt Ringo, and I live in Louisville. After an amazing first year at The Gatton Academy, I have been conducting research this summer under the Research Internship Grant. To just say “thank you” would not be enough. Without this opportunity, this summer would have been spent working at a Dollar Tree, not a leading lab in blood preservation that quite possibly will shape the world for years to come.

I am working with Dr. Michael Menze at the University of Louisville, researching the role of LEA Proteins in the ability of organisms to live without water. By the end of my project, I hope to introduce these proteins into human blood and dry them in an attempt to create a shelf-stable, room-temperature viable storage method for blood. Instead of having liquid samples that must be refrigerated and discarded after a certain time, these samples could be stored indefinitely, effectively ending the world’s blood shortage.

Even in my short time at The Gatton Academy, I must say it has changed my life—for the better. For me, The Gatton Academy has been a veritable treasure trove of wonderful staff and great friends. My roommate remains one of my closest friends, and my floormates overall personified a sense of camaraderie not seen in many places. The Gatton Academy is a melting pot of cultures, ideas, and beliefs that all come together to improve us as a whole. It is this diversity that makes us strong.

Qué vaya con Dios,
Wyatt Ross Ringo



“This summer, I am looking forward to the experience of working in an undergraduate lab and contributing to the broader body of scientific knowledge while solving real-world issues.”

“As a young person interested in STEM, this research is unlike traditional labs done in high school, as it poses a real, worldwide ability to change. Successful completion and expansion could result in fixing the world’s blood supply issues.”

“The Gatton Academy serves to educate and prepare those looking to excel and be the best they can be. Through the experiences found here, Kentucky is raising a new generation of brilliant minds to fix not just today’s problems, but tomorrow’s.”

Wyatt Ringo

Home High School:
Trinity High School

Research Area:
Biology

Career Goal:
Medical Doctor

Research Mentor:
Dr. Michael Menze
University of Louisville,
Department of Molecular Physiology
and Bioenergetics

Extracurricular Activities:
Boy Scouts of America (Eagle Scout)
and Barbershop Singing



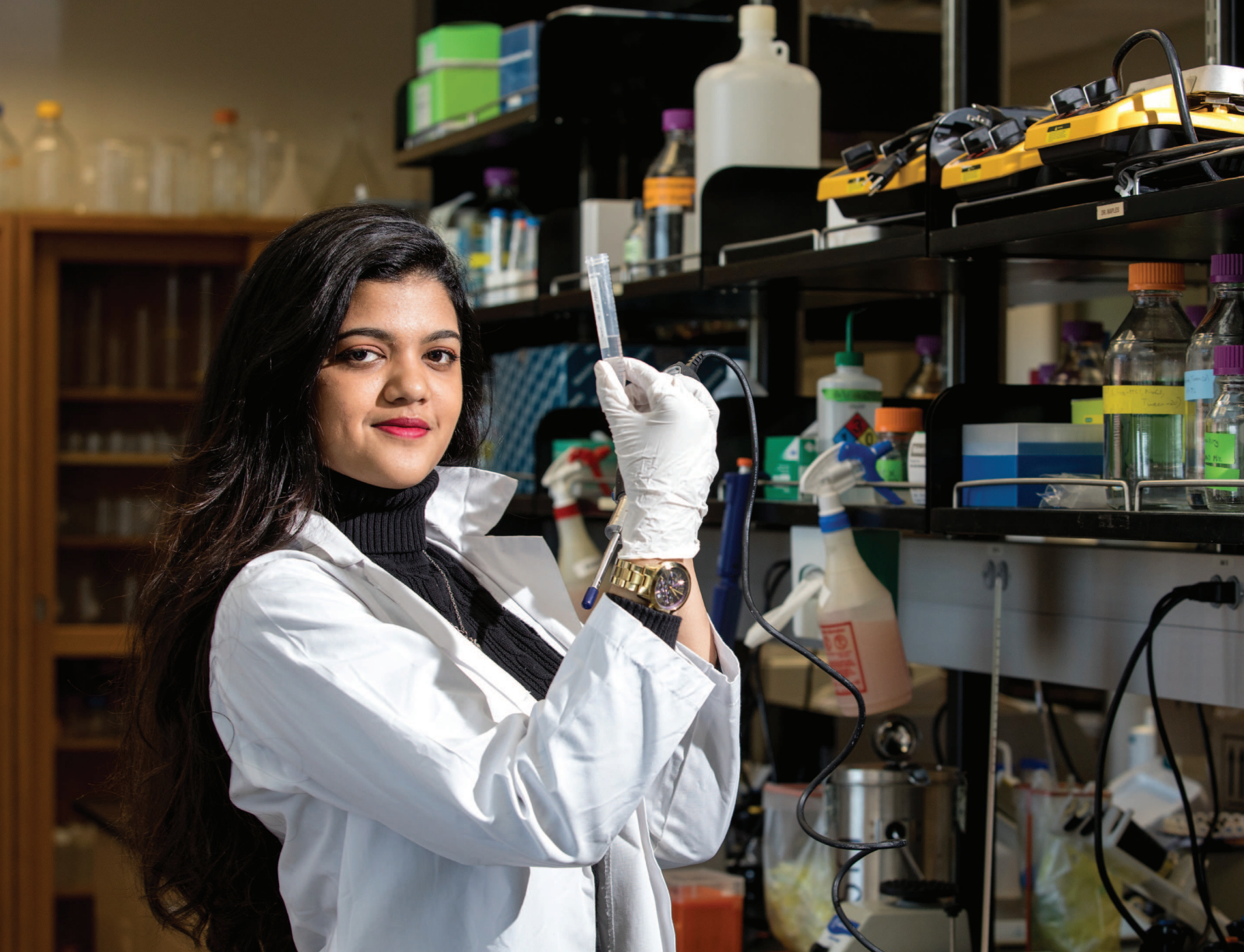
Sasha Sairajeev
Frankfort, Kentucky (Franklin County)

My name is Sasha Sairajeev, and I am from Frankfort, Kentucky. Growing up, I had always been interested in math and science, which I explored through extracurricular activities such as Governor's Cup, as well as being guided by my genuine curiosity. My eagerness to learn more led me to my current interests in biology and medicine. Alongside this, I have always loved public speaking and engaging in leadership-related activities. I knew that being a physician encompassed both of these passions, so I began to pursue my dream throughout high school. That is how I stumbled across The Gatton Academy: a means to begin my long journey to becoming a doctor.

One thing I have gained from Gatton is the opportunity to participate in undergraduate research. Over the summer, through the Research Internship Grant, I have researched the effect of various blood pressure drugs on mice subjected to sleep fragmentation. My career goal is to be a cardiothoracic surgeon, and because of this research experience, I have been able to perform surgical procedures and perfect various advanced laboratory skills I will use in the future.

The generosity of those who support the ambitions of young STEM-oriented students across the state inspired an idea that a fellow Gatton student and I conjured up to eventually win first place in the state in the Future of Public Health in Kentucky Contest. We posed the idea that inspiring the youth of Kentucky to pursue STEM fields through research will stimulate investigations into issues that are of immediate concern, e.g., combatting antibiotic resistance. I know that our state and its students will benefit greatly from such generosity.

Sincerely,
Sasha Sairajeev





“I will be using my research experience as a launching point for the Regeneron Science Talent Search. After a semester’s worth of research, as well as six weeks over the summer, I will have sufficient content to not only apply to the Regeneron competition, but I will also be able to present my research at conferences across the country.”

“Through research, I learned that I was a hands-on learner, which increased my confidence in potentially becoming a surgeon.”

“The Gatton Academy not only helps you grow academically, but also helps you grow socially, personally, and in terms of maturity. At Gatton you learn so many things about yourself and your interactions with others. The short-term benefits of Gatton are just the tip of the iceberg when, in reality, there are so many that continue to affect you throughout your life.”

Sasha Sairajeev

Home High School:

Franklin County High School

Research Area:

Biology

Career Goal:

Cardiothoracic Surgeon

Research Mentor:

Dr. Noah Ashley
WKU Department of Biology

Extracurricular Activities:

Yearbook, Gatton Student Y Chapter,
K-Pop Club, Science Bowl, and
Space Club



Julia Stekardis
Louisville, Kentucky (Jefferson County)

My name is Julia Stekardis. I am from Louisville, and I went to duPont Manual High School and the Youth Performing Arts School before coming to Gatton. Since the beginning of my time as a Gatton Academy student, I have taken on two fascinating research projects. Fall and spring semesters I was in the Genome Discovery and Exploration Program, where I discovered a novel bacteriophage that I named RainyJennifer. This summer, I am conducting research at the University of Louisville, where I am studying the effects of indole (a volatile organic compound emitted by plants when they encounter stress cues) on nutrient uptake in *Arabidopsis thaliana*. Because of the Gatton Research Internship Grant, I have gained a valuable experience working in a professional lab, I have acquired important skills that will be useful in all future work that I pursue, and I have a better sense of my short-term and long-term goals.

My interest in The Gatton Academy sparked from my drive to explore the STEM field and pursue my growing interest in becoming a physician. I attended one of Gatton's Preview Days in ninth grade, I followed Gatton on social media, and I kept learning things about Gatton that made it and the community more appealing. Now that I am approaching my senior year at the Academy, I have had experiences and growing opportunities I could only receive at Gatton. I have been challenged to think outside the box, to tackle problems from multiple unique angles, and to take on new opportunities that I would not have known about before. While at Gatton, not only have I thrived academically, but I have also gained confidence in myself and my ability to reach my goals.

Sincerely,
Julia Stekardis

Julia Stekardis

Home High School:

duPont Manual High School

Research Area:

Plant Biology

Career Goal:

Physician

Research Mentor:

Dr. Christopher Frost
University of Louisville,
Department of Biology

Extracurricular Activities:

Gatton Academy Medical
Association, Hope Harbor Volunteer,
and Gatton Science Dance

“The coolest thing about summer research is that because classes are not occurring, all of my time and effort can be dedicated to research. Conducting research every day of the summer is going to take a lot of hard work, but it is not going to feel like work because it will be such a thrilling experience.”

“The aspect of my second year at The Gatton Academy that I am most looking forward to is the opportunity to mentor the incoming junior class of 2020. Beginning the Gatton journey is an overwhelming experience for many, so I’m excited to help the juniors persevere through the unique challenges that they are facing, while I model the potential outcomes of overcoming those challenges.”

“My favorite Gatton Academy memory to date was the Solar Eclipse Festival. Not only was that a remarkable historical event, but it was also the first time that I felt like I was truly a part of the Gatton community.”







Alexander Stewart
Clearfield, Kentucky (Rowan County)

I come from rural northeastern Kentucky, an area without much opportunity for scientific discovery. Enrolling at the Academy has completely changed the course of my life and endowed me with opportunities and experiences that were not possible in my hometown. Instead of the traditional high school curriculum, I have been able to find my passion and flesh out my interests through classes that I am genuinely excited about. Bioinformatics has probably been my favorite class so far. To date, the most impactful of my Academy experiences has been the summer internship that has allowed me to explore my interest in virology.

Over the summer, I have worked closely with WKU's Dr. Claire Rinehart to study the structure of a unique bacterial virus. The experiences I have had and the knowledge that I have gained over the course of the internship will be invaluable in my academic pursuits and my career plans. I wish to pursue a Ph.D. in virology and become a scientific researcher. Because of the experience that I had this summer, that interest is more solid than ever. I have finally found what I want to do with my life.

Sincerely,
Alex Stewart

Alexander Stewart

Home High School:

Rowan County Senior High School

Research Area:

Microbiology

Career Goal:

Virology

Research Mentor:

Dr. Claire Rinehart
WKU Department of Biology

Extracurricular Activities:

Boy Scouts of America, Venture Club,
and Association of Undergraduate
Geneticists

“On my first day at The Gatton Academy, I felt excited but unsure about how well I would fit into the academic and social environment at the Academy. Now, I feel right at home. I’m confident in my abilities as a student and as a member of the Gatton community.”

“During my first year at Gatton, I did molecular biology research with Dr. Ashley. We were studying the effect of acute sleep deprivation on the immune system of zebra finches. During my time in Dr. Ashley’s lab, I solidified my interest in molecular biology and honed my laboratory skills.”

“The thing that I look forward to the most about my second year at the Academy is continuing the research I’m doing this summer into another research project during the fall semester.”







Lily Vowels
Elizabethtown, Kentucky (Hardin County)

I came to The Gatton Academy because I wanted to find my passion. Since middle school, I knew I wanted to do something in science; I just did not know what. I did know, however, that The Gatton Academy would help me find it. Because we are required to take classes in various areas of science, we are able to discover what we enjoy and what fascinates us. I discovered that I have a passion for the environment. I want to learn more about it, and I want to protect it. Without attending The Gatton Academy, I may not have uncovered this particular interest.

Since I have been able to identify my passion, I was then able to find an ecology research opportunity with the Department of Biology. This summer, I am researching how underground geological features affect water availability and tree growth at the WKU Green River Preserve. While conducting my research, I am learning how to write research papers, how to make maps, and, most amazingly, how to fly a drone. I never believed that as a high school student I could learn so much so quickly.

Because of the Academy, hundreds of Kentucky students have the opportunity to find their passions. We are able to discover what we love and how we want to change the world. Without the Academy, I would still be at my home school wondering what my passion was.

Thank you,
Lily Vowels





“The best advice my mentor has given me is to learn a skill that sets you apart from your peers. He told me that when you learn your skill, it makes you more attractive to colleges or employers. This advice inspired me to learn Geographic Information Science, a tool not many of my peers know how to use.”

“During my second year at the Academy, I am most looking forward to continuing my research. Although I get to do field work this summer, the important work of data analysis and making sense of my results will happen next year. That is the phase of research where you get to see all your hard work come together.”

“As a young person interested in STEM, research gives me an opportunity to discover what I am truly passionate about. By doing research I will be able to discover if I actually like doing work in a certain field or if it just sounds interesting.”

Lily Vowels

Home High School:

John Hardin High School

Research Area:

Ecology

Career Goal:

Geologist/Geological Engineer

Research Mentor:

Dr. Albert Meier

WKU Department of Biology

Extracurricular Activities:

Gatton Student Y Chapter,
Envirothon, Beta Club, Venture Club,
Ecology Club, and Gatton Academy
Leaders in Education



Sydney Wheeler
Scottsville, Kentucky (Allen County)

During the class of 2019's GROWeek last August, we attended a research fair full of professors, students, and presentations aimed at getting us interested in research. At the time, the fair felt overwhelming and a bit scary; how was I going to convince a professor to take me under their wing when I knew nothing? Looking back, the fair was great because it kick-started my interest in finding a research project. Almost a year later, I am writing this letter to you from my desk inside the Gustav Fechner Vision and Haptics Laboratory, where I have been doing research with Dr. Farley Norman on human perception of 3D shape. Research, which began as a daunting task, has become one of the highlights of my time at Gatton.

I have been given the opportunity to learn with professors who care about their studies and about me, as well as the chance to broaden my interests in math and science. The research I have been conducting this summer has confirmed my interest in research as a career and has led me to want to pursue an M.D./Ph.D. course of study focusing on neuroscience. Thank you so much for providing me with the chance to attend a school that can challenge me so much.

Forever grateful,
Sydney Wheeler





“This summer, I am most looking forward to working on a research report and learning about scientific writing from my mentor, Dr. Norman. He has published over 90 papers in scientific journals, so it’s really exciting to get to learn from someone who is both an expert in his field and an expert at scientific writing. We’ve worked on a couple papers together over the past year, but I’m looking forward to writing my own with his guidance.”

“So much of what makes Gatton special are the people who are here, and that’s become one of my favorite aspects of the Academy.”

“Working in Psychological Sciences, specifically in perception, fits into my future goal of going into an M.D./Ph.D. program because it combines research with the study of the human brain, which is a specific interest of mine. Working in the research lab over the past year has helped me realize that research is something that I want to do long term, and it has really led me to want to pursue both an M.D. and a Ph.D.”

Sydney Wheeler

Home High School:
Greenwood High School

Research Area:
Visual and Haptic Perception in Humans

Career Goal:
M.D./Ph.D. in Neuroscience with a focus on neurodegenerative diseases

Research Mentor:
Dr. Farley Norman
WKU Department of Psychological Sciences

Extracurricular Activities:
Gatton Student Y Chapter, Future Business Leaders of America, Yearbook, Gatton Science Dance, CryptoCurrency Club, and Boys and Girls Club Tutoring



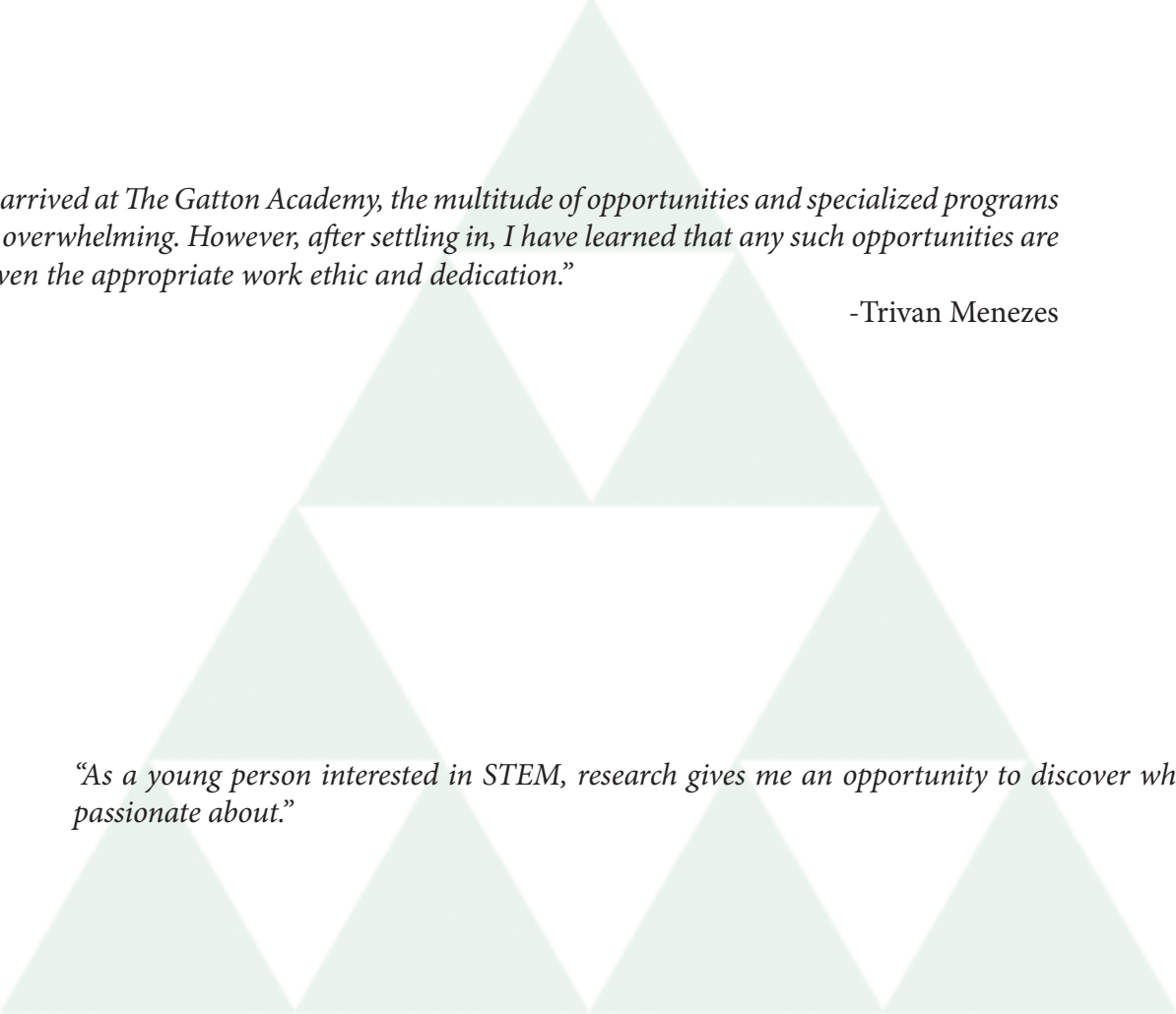
Isabel
Chumley

Jim Mmesegha
 Kelly Johnson
 Skira Zichang
 Elizabeth Embury
 Amaal Younis
 Sydney Wheeler
 Samir M. Alkhatib
 Julia Stepanovs
 Daria Moshina
 Daria Moshina
 Daria Moshina
 Elizabeth Vedun
 Rithik Reddy
 Abdullah Atayeh
 Rana Alfaruq
 Matt Proctor
 Evan Spadickson
 Ross Spurr
 Wyatt Reed

THE GATTON ACADEMY



of Mathematics and Science

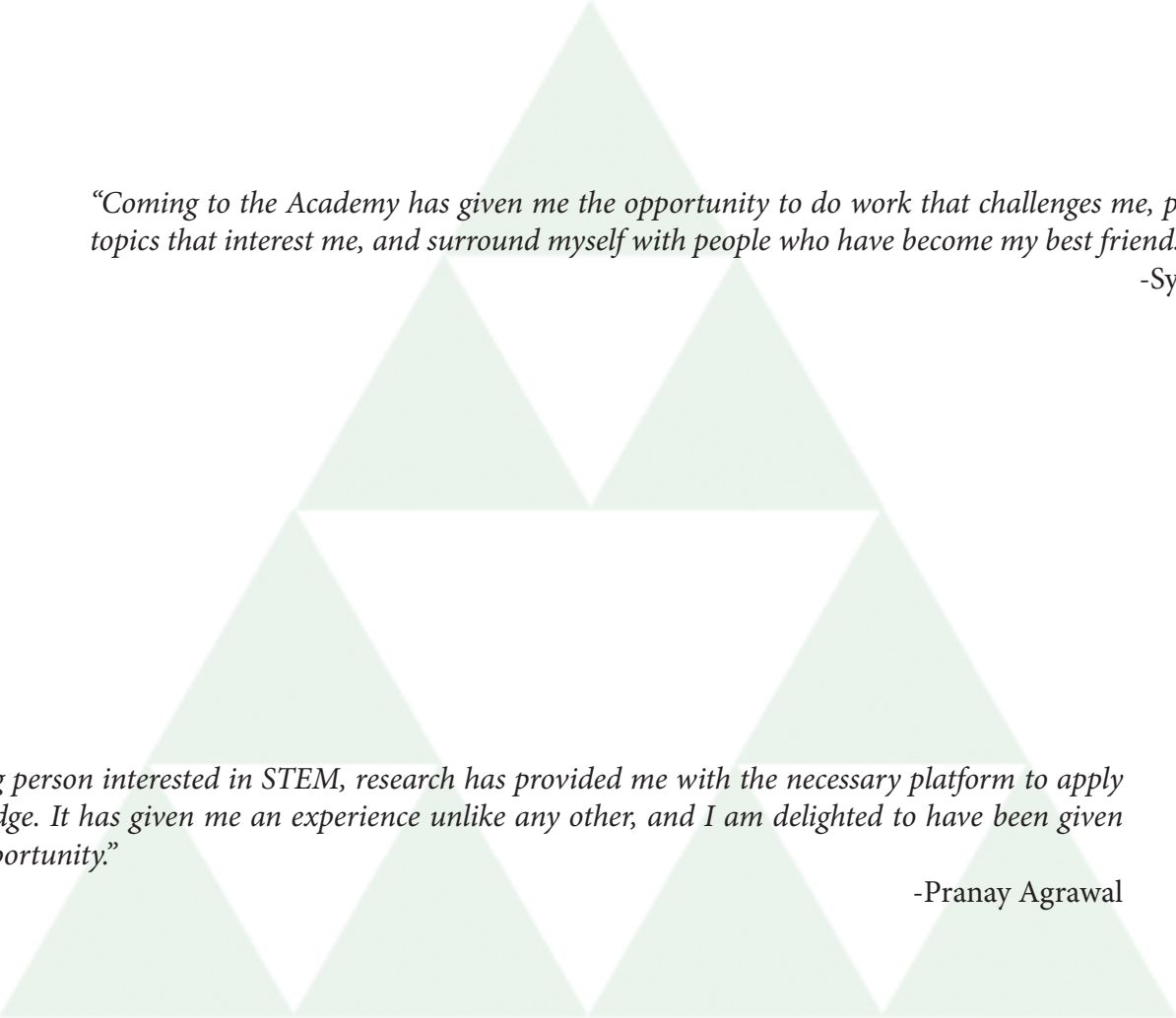


“When I first arrived at The Gatton Academy, the multitude of opportunities and specialized programs seemed quite overwhelming. However, after settling in, I have learned that any such opportunities are achievable given the appropriate work ethic and dedication.”

-Trivan Menezes

“As a young person interested in STEM, research gives me an opportunity to discover what I am truly passionate about.”

-Lily Vowels



“Coming to the Academy has given me the opportunity to do work that challenges me, pursue research topics that interest me, and surround myself with people who have become my best friends every day.”

-Sydney Wheeler

“As a young person interested in STEM, research has provided me with the necessary platform to apply my knowledge. It has given me an experience unlike any other, and I am delighted to have been given such an opportunity.”

-Pranay Agrawal



