Undergraduate students **Tyler Potter** (Chemistry), **Virginia Martelli** (Chemistry) and **Ayden Wilbur** (Kinesiology – Exercise Science) represented SUNY Cortland at the biannual SUNY-wide symposium of undergraduate research and creative activities entitled Discovery- An Undergraduate Showcase. Held in the New York State Legislative Office Building, the showcase brought together talented undergraduate student researchers from across all 64 SUNY institutions, SUNY Administration officials and members of our New York State Legislative delegation.

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**GET YOUR hands on**

**RESEARCH**
Lichen Diversity as a bio indicator at Hoxie Gorge

“My fellowship has given me a real opportunity to do real research. Definitely, the best summer I’ve ever had.”

Ethan’s research involves a survey of lichen species within secondary succession forested areas of Hoxie Gorge, SUNY Cortland’s outdoor education facility south of the campus. This field-based research involves the identification of lichen species from a variety of trees, downed logs, rocks, and exposed ground from approximately 50 acres of Hoxie Gorge. Utilizing quantitative methods of diversity analyses, Ethan is testing the sampled diversity of the secondary succession with old growth forest in Hoxie and will also test the hypothesis that the diversity of lichen species will have declined due to increasing air pollution since the last lichen survey of the area was conducted some 30 years ago. One of the outcomes of the work will be the development of an online key with digital images of observed species.

Faculty Mentor
Timothy J. Baroni, Distinguished Professor, Biological Sciences

“My life is richer when I get students like Ethan interested in the things that I’m working on.”
Assessing the impact of 2-2-dibromo-3-nitrilopropionamide, a microbiocide used in hydraulic fracturing fluid, on benthic microbial communities

“Conducting independent research like this was the reason I came to Cortland and has influenced my decision to go on to grad school.”

Fluids required in the hydraulic fracturing process for the extraction for natural gas are used in large volumes and consist of different compounds that can pose a serious risk to natural waterways. John’s research involves one fracturing fluid, 2-2-dibromo-3-nitrilopropionamide (DBNPA), which is a micro biocide and has a known effect of eukaryotic species. John is testing the effect of this compound on benthic anaerobic sediment microbial communities (bacteria and Achaea), which are important sources of CO$_2$ and the global carbon cycle. His research involves measuring the consumption rate of organic substrates and the production of biogas in reactors to determine the metabolic needs of the Achaea and subsequently sequencing the proteins using tandem mass spectrometry analyses.

Faculty Mentor
Jeffery Werner, Assistant Professor, Chemistry

“Working with John has been fantastic! He has taken the initiative to design experiments and his work has led to a much deeper understanding of how contaminants can affect water systems.”
Heather Clancy
Biology

The dependence of GDP-mannose 3, -5 epimerase activity on the presence of functional VTC3 protein in Arabidopsis thaliana

This research has provided me with incredible opportunities and new skills that will benefit me down the road as I plan to go into medical school.”

Heather’s research involves the genomics involved in the production of proteins responsible for the regulation of ascorbic acid (vitamin C) in plants. As part of a larger team of researchers in Dr. Conklin’s lab (see also Alexander Meyers research), Heather is working to isolate a gene that regulates ascorbic acid synthesis through several proteins. Her research involves state-of-the-art laboratory analyses and techniques including qPCR (quantitative real time polymerase chain reaction) and HPLC (high performance liquid chromatography) and has involved working closely with researchers at Cornell University and also the University of Exeter in the United Kingdom.

Faculty Mentor
Patricia Conklin, Associate Professor, Biological Sciences

“Working with talented and enthusiastic students like Heather has strengthened my belief that those going into professional fields can benefit from conducting research.”
Rebecca Elliott
Childhood Education

An investigation of digital autobiography and photo narration to improve verbal and written language fluency among immigrant children

“My project reinforced my deeply held belief that every child has the capacity to learn and succeed. I’m convinced that research can help educators find new ways to aid all students in reaching their potential.”

Rebecca’s research addressed communication problems inherent in educating immigrant English Language Learners. Rebecca designed project-based learning where immigrant student participants constructed photo and audio narratives of their lives to increase interpersonal communication skills and practice self-directed learning. Through analyses of qualitative survey data generated by student participants and interviews with teachers and parents, the research supported the hypothesis that constructing digital narratives increases students’ sense of empowerment, cultural awareness and communication abilities. The project proposed one method to address a number of Common Core English Language Arts standards and a variety of integrated learning objectives.

Faculty Mentor
Cynthia Benton, Professor, Childhood, Early Childhood Education

“Rebecca’s project was a perfect example of the way research and theory can improve practice, connecting higher education with public school goals. Her work provided meaningful support for individual student learning while investigating a challenging global education dilemma.”
Nathan Francisco
Biology

Lichen diversity as a bio indicator in the climax forest area of Hoxie Gorge

“My research project has shown me that learning by doing is much more effective than sitting in lectures.”

Nathan’s research involves a survey of lichen species within climax forest areas of Hoxie Gorge, SUNY Cortland’s outdoor education facility south of the campus. This field-based research involves the identification of lichen species from a variety of substrates (tree surfaces, downed logs, rocks, and exposed ground) from approximately 70 acres of Hoxie Gorge’s climax forest. Utilizing quantitative methods of diversity analyses, Nathan is testing the sampled diversity of the climax forest in Hoxie with that of secondary succession (see Ethan Child’s research summary) and will also test the hypothesis that the diversity of lichen species will have declined due to increasing air pollution since the last lichen survey of the area was conducted some 30 years ago. One of the outcomes of the work will be the development of an online key with digital images of observed species.

Faculty Mentor
Timothy J. Baroni, Distinguished Professor, Biological Sciences

“Nathan’s work has already led to discovery of a much more rich and diverse lichen community at Hoxie Gorge than was previously known.”
Student financial engagement and student governance as a key to success in higher education

“Through designing and conducting this research I have learned many important skills including the role of value judgments in governance and how to objectively see different sides of the issues.”

Julie’s research focuses on student governance in public colleges and universities during a period of fiscal austerity. Specifically, her research looks into fee-based funding for student clubs, student organizations and extra-curricular activities in higher education systems and the potential misappropriation of these funds into areas normally considered part of academic programing. Using both qualitative methods and interviews of SUNY administrators and student representatives from the State University of New York system, the primary question addressed by Julie’s investigation is: Has student governance been negatively impacted by fiscal practices forced on college administrations by tight budget circumstances?

Faculty Mentor
Henry Steck, Professor, Political Science

“Having come late to the game of mentoring undergraduate research, working with Julie has shown me how important it is not only for my own professional development, but the rewards of making a good student even better”
Jeremy Kraus
Biology/Environmental Science

The diversity of hexanoic acid producing bacteria in anaerobic bioreactors

Jeremy’s research involves sequencing bacterial genomes and identifying useful proteins using a variety of analytical and computational techniques. Specifically, Jeremy is searching for enzymes that can be used by bacteria to produce hexanoic acid in a bioreactor. Working with researchers at Cornell University, Jeremy and faculty mentor Werner are performing metagenomic sequencing on bacteria from the bioreactors and tracking bacterial populations and physiology throughout a one-year time series. The computational aspect of Jeremy’s work has made him an expert in Linux systems and bioinformatics. This research is important as it provides insight into designing efficient technologies for biofuel production and potentially a way to deal with organic wastes.

Faculty Mentor
Jeffery Werner, Assistant Professor, Chemistry

“I’ve enjoyed collaborating with Jeremy on this project, his computational skills and knowledge of Linux has been essential in my lab.”
Chelsea Lachman
History

A traffic in fingers: A medieval relic map

“I have learned an incredible amount--not only about medieval relics, but also the skills involved in real historical research and fact checking and even having to manage the frustration of dead ends and language barriers.”

Chelsea is investigating the provenance and movement of classical and medieval Christian relics across Europe. Specifically, she is researching the relics of saints described in Mathilda of Flanders’ relic inventory that outlines the sacred remains donated to the Abbey of the Holy Trinity in Caen, France. Using a variety of historical investigative tools combined with state-of-the-art geographical information systems, her research is seeking to trace the movement of relics to their present day location and present this information in an interactive online map to better understand the significance of the relics.

Faculty Mentor
Laura Gathagan, Assistant Professor, History

“As my first undergraduate research student here at Cortland, Chelsea proved to be an indefatigable researcher who never let an obstacle slow her down.”
Alexander Meyers
Biochemistry

*Investigations into the function of the VTC3 protein in the biosynthesis of ascorbic acid in Arabidopsis thaliana*

“As first to graduate with the Department’s new program in biochemistry, this research has afforded me a great opportunity to gain experience and training in my field.”

Al’s research involves the genomics involved in the biosynthesis of a unique protein responsible for the regulation of ascorbic acid (vitamin C) in plants. As part of a larger team of researchers in Dr. Conklin’s lab (see also Heather Clancy’s research), Al is working to isolate a gene that regulates ascorbic acid synthesis through a largely unstudied protein. His research involves state-of-the-art laboratory analyses and techniques including qPCR (quantitative real time polymerase chain reaction) and HPLC (high-pressure liquid chromatography) and has involved working closely with researchers at Cornell University and also the University of Exeter in the UK.

**Faculty Mentor**
Patricia Conklin, Associate professor, Biological Sciences

“Having recruited Al from my molecular biology class to become a researcher in my lab, it has been wonderful watching Al grow.”
Kristin Neal
Biology

The effects of temperature and other disinfectants against Legionella pneumophila

“My research experience has built my confidence to think independently beyond what I had to do in my lab course and taught me how to adapt and problem solve when things don’t go according to plan.”

Kristin’s research involves investigating the biology and ecology of the bacterium Legionella pneumophila that can lead to the pneumonia known as Legionnaires Disease. Her research entails developing biofilms containing communities of the bacterium and testing the hypothesis that biofilm populations of Legionella will have greater resistance to disinfection than planktonic cultures of the microbe. As part of this work, she is developing a new model medium of supplemented biofilm broth for Legionella cultures. Comparing the survival of these two cultures after exposure to various degrees of disinfecting water temperatures or chlorine treatment will reveal important information about the growth of Legionella in man-made water sources.

Faculty Mentor

Christa Chatfield, Assistant Professor, Biological Sciences

“The results already obtained by Kristin inform my own research and make it exciting for me to come to work.”
Edward Ten Eyck
Exercise Science

Effects of individually-tailored exercise on psychological, physiological, and biomechanical responses during a 5 km cycling time trial with and without a 3D pacer

“My undergraduate summer research fellowship in exercise science has crystallized my desire to continue with research and obtain a graduate degree and will continue inform me as I coach and train athletes in my own business.”

Edward’s research applies virtual reality-based technology in sports training. By hooking up participants to the College’s new Computrainer™ cycling ergometer 3D system coupled with bicycle resistance trainer, Edward is able to measure participant performance through physiological (e.g., oxygen consumption, heart rates) and biomechanical (pedaling efficiency) outputs. Using incremental cycling time trials for multiple human subjects with and without the virtual reality avatars, Edward is investigating to what effect the 3D virtual reality system may have on performance as determined by the statistical analyses of the physiological and biomechanical outputs data.

Faculty Mentor
Erik Lind, Assistant Professor, Kinesiology

“Working together with Ed as a peer colleague has challenged me to think about the work I do and has informed my own research in the field.”
Tucker Wright
Biology

Synthesis of a compound isolated from Cactoblastis

“Conducting research is totally worth it—it’s allowed me gain a more practical knowledge in my field in addition to the abstract theories I’ve learned in class.”

Tucker’s research involves the synthesis of the compounds comprising the chemical pheromone trail left by the invasive caterpillar species Cactoblastis cactorum—which eats prickly pear cactus. This chemical trail, first identified by faculty and student researchers at Cortland, is an important signal in communication among the caterpillars as they destructively search for and consume prickly pear. To synthesize and identify the compounds, Tucker is using advanced analytical instrumentation in Cortland’s biochemistry laboratory including gas chromatography and NMR spectrometry.

Faculty Mentor
Frank Rossi, Associate Professor, Chemistry

“Working with someone as intellectually curious as Tucker has been fantastic and has given me a different perspective on what insights students can bring to research problems.”
Other Undergraduate Research Awards

The following undergraduate students were awarded a 2011-12 Undergraduate Research Council Travel Grant to attend conferences in which they were a presenter

Erik Burrows: NYPSA at Wagner University (Staten Island, NY)
Kaitlyn Cooper: Federation of SHOCK Societies (Miami Beach, FL)
Beverly Cummings: Southeastern Medieval Ass. 37th Annual Conference (Decatur, GA)
Julie Gregg: Berkshire Association for Behavior Analysis and Therapy (Amherst, MA)
Julie Herbert: Southeastern Medieval Ass. 37th Annual Conference (Decatur, GA)
Stevie-Ann Hodgson: Berkshire Assoc. for Behavior Analysis and Therapy (Amherst, MA)
Virginia Martelli: 243rd Annual Meeting of the American Chemical Society (San Diego, CA)
Virginia Martelli: SUNY’s Discovery: An Undergraduate Showcase (Albany, NY)
Laura Platt: The Northeast Natural History Conference (Syracuse, NY)
Tyler Potter: SUNY’s Discovery: An Undergraduate Showcase (Albany, NY)
Ayden Wilbur: SUNY’s Discovery: An Undergraduate Showcase (Albany, NY)

The following undergraduate students were awarded a 2011-12 Undergraduate Research Council Small Grant in support of their research

Hope Ostrander: Blunt force trauma to Sus domesticus skulls due to vertical deceleration on different strata
Timothy McKillen: Topographic mapping of the Çadir Höyük archaeological site, Turkey
SUNY Cortland’s Undergraduate Research Council promotes SUNY Cortland as an institution fully committed to student research, scholarship, and creative pursuits. To this end, the Council will assure that faculty and students have easy access to information and resources on best practices, mentoring, student publishing, and other forums for the dissemination of students’ scholarly works. Through funding provided by the offices of the Provost’s and Sponsored Programs, partnership with Office for Resident Life and Housing and the generosity of donors to the College Foundation, the Undergraduate Research Council directly supports research projects through a number of competitive fellowships and grants.

**URC Director:** Christopher McRoberts  
**URC Members:** Cynthia Benton, Philip Buckenmeyer, Terrence Fitzgerald, Joy Hendrick, Amy Henderson-Harr, Kathryn Kramer, Mark Prus, Sharon Steadman, and Orvil White  
**Administrative Support:** Haley Zurell  

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