

UNION COLLEGE



ANNUAL REPORT OF EXTERNAL FUNDING

JULY 2017 | JUNE 2018

COLLEGE RELATIONS
OFFICE OF EXTERNAL RELATIONS
& COLLEGE GRANTS

Proposals and Awards: A Year in Review

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Proposals and Awards: A Year in Review

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NEW AWARDS

Academic Opportunity Program Scholarships to Enhance Access and Excellence in Undergraduate Education at Union College

THE HEARST FOUNDATIONS

PROJECT PERSONNEL:

Program Director **Philip Poczik** (AOP/HEOP)

ABSTRACT:

Union College's Academic Opportunity Program (AOP) was established in 1969 and is designed to admit students with great potential who might not otherwise have the opportunity to attend Union due to academic and/or economic reasons, and to actively support these students through to graduation. This grant from The Hearst Foundations will help support and better prepare the most promising AOP students who are poised for success after graduation – in graduate studies, professional endeavors, and as contributors to their local communities and, more broadly, to society.

Acquisition of an Inductively Coupled Plasma Mass Spectrometer for Expansion of Analytical Activities and Research Training in the Earth Sciences

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Holli Frey** (Geology); Co-PIs **Dr. John Garver** (Geology), **Dr. David Gillikin** (Geology), **Dr. Kurt Hollocher** (Geology), and **Dr. Donald Rodbell** (Geology); Senior Personnel **Dr. Laura MacManus-Spencer** (Chemistry), **Dr. Matthew Manon** (Geology), and **Dr. Heather Watson** (Physics & Astronomy)

ABSTRACT:

The acquisition of a new inductively coupled plasma mass spectrometer (ICP-MS) supports societally relevant environmental and pollution-related water quality studies and undergraduate research training in the use of state-of-the-art techniques, enabling them to transition directly into graduate schools and technical jobs. The higher detection limits, increased analytical speeds, and dynamic mass range of the ICP-MS allow for projects in: 1) the study of volatile concentrations in magmatic apatite to better understand the state of volatile saturation prior to eruptions and to correlate widely dispersed volcanic deposits; 2) advance studies of trace element zoning in speleothems, which may be useful in both paleoclimate reconstruction and to track modern and archeological pollution events; 3) U-Pb dating of zircons with a quadrupole ICP-MS; 4) measuring biogenic silica in terrestrial lake core samples with increased throughput and decreased amount of sample destroyed; and 5) measuring element diffusion profiles in experimental iron-nickel alloys and sulfides to constrain the formation of planetary cores. The data resulting from these projects will establish data sets that will improve scientific understanding of various hydrologic systems that impact our present society.

Advancing Adirondack Studies at Union College

THE ANDREW W. MELLON FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Strom Thacker** (Stephen J. and Diane K. Ciesinski Dean of Faculty and Vice President for Academic Affairs); Program Director **Dr. J. Douglass Klein** (Economics and Faculty Director of the Kelly Adirondack Center)

ABSTRACT:

Union's Advancing Adirondack Studies initiative aims to develop a new Adirondack mini-term and to provide greater access to the collections housed in the Adirondack Research Library (ARL) at the Kelly Adirondack Center. An Adirondack Study group, comprised of faculty from across academic divisions and College librarians, will study the ARL collections, present findings, and share ideas to ignite discussion and intellectual exploration of the Adirondacks. The Adirondack Study group will identify themes to shape the development of the course segments, experiential learning, and research components for the mini term. The immersive mini term experience will include guided trips to local communities, historic sites, and places that will educate students about the region that has influenced writers, artists, and philosophers throughout history. The initiative also supports opportunities for faculty development, including a Faculty Development Institute that will offer training in design-thinking pedagogy for faculty interested in incorporating resources of the ARL into their teaching. The grant will support an archivist whose expertise will help guide an inventory, processing, and publicizing of the collections in the ARL giving greater access to the Union community and scholars more broadly.



Professor Holli Frey, Rebecca Lippitt '19, and Madison Corcoran '19 sampling rhyolites for lava domes in the shadow of Broken Top Volcano, Central OR. Rhyolites are rare in the Cascade volcanic arc, so the team is trying to understand their genesis. Image courtesy of Dr. Holli Frey.

NEW AWARDS

Continued

Aerogels – A Catalyst for Cleaner Air

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator and Technical Lead **Dr. Ann Anderson** (Mechanical Engineering); Entrepreneurial Lead **Elizabeth Donlon '18** (Mechanical Engineering); I-Corps Mentor **Jeff Goronkin** (URBAN CO-WORKS/Buzz Media Solution); Senior Personnel **Dr. Bradford Bruno** (Mechanical Engineering) and **Dr. Mary Carroll** (Chemistry)

ABSTRACT:

Funded through the Innovation Corps (I-Corps™) Teams program at NSF, this grant supports the exploration of developing aerogel-based catalysts as sustainable, environmentally friendly material for pollution mitigation applications. The I-Corps Teams program is designed to get researchers with a history of NSF funding out of the laboratory to explore the commercialization potential of their research products. The team will engage with industry; talk to customers, partners and competitors; and encounter the uncertainty and excitement of creating successful innovations. The Technical Lead, Entrepreneurial Lead, and Mentor participate fully in the I-Corps Curriculum, which provides real-world, hands-on, immersive learning about what it takes to successfully transfer knowledge into products and processes that benefit society. Aerogels are materials that could reduce, or even eliminate, the use of precious metals such as platinum, palladium, and rhodium currently used in automotive exhaust after-treatment systems. Aerogel catalysts could have significant positive economic and environmental impact on the nation. The commercialization of these materials will extend the design space available to pollution-control system engineers and open new, potentially transformative avenues for meeting current and future pollution regulations.

An Interdisciplinary Faculty Community Using a Protein-focused Course Based Undergraduate Research Experience (CURE) to Improve Student Learning

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Kristin Fox** (Chemistry)

ABSTRACT:

The Malate Dehydrogenase (MDH) CUREs Community project involves protein-centric CUREs that focus on a variety of research areas related to MDH. This project aims to fill a CUREs gap by creating self-supporting and sustainable protein-centric CUREs focused on the enzyme MDH. This project will examine two critical aspects of a CURE: 1) the impact of course-long CUREs (cCUREs) as opposed to shorter modular CUREs (mCUREs), and 2) the role of research collaborations across courses or institutions to assess their impact on student learning, retention and motivation. This project will build a framework supporting a sustained, protein-centric CURE community to foster adoption amongst higher education institutions to impact a large and diverse set of students.



[LEFT] Entrepreneurial Lead Elizabeth Donlon '18 standing next to catalytic converters during a visit to Katcon in Auburn Hills, MI. [RIGHT] Principal Investigator and Technical Lead Ann Anderson, I-Corps Mentor Jeff Goronkin, and Entrepreneurial Lead Elizabeth Donlon '18 stand under a vehicle during an industry visit. Images courtesy of the I-Corps Aerogel Team.

Bridging the Gap from Northern Iberia to Northwest Africa to Reconstruct Atmospheric Dynamics and Hydroclimate for the Last 2,500 Years

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. David Gillikin** (Geology)

ABSTRACT:

This project aims to provide a spatial and temporal context for ongoing and future climatic changes in the Mediterranean region by constructing a 2,500-year-long history of hydroclimate variability from precipitation-sensitive stalagmites formed in caves in central and southern Portugal. Rainfall in Iberia is strongly correlated to the strength of the Azores sub-tropical high-pressure system, and these cave sites lie at its climatological epicenter. This project will bridge the hydroclimate knowledge gap for the last 2,500 years using sub-decadally resolved, multi-proxy stalagmite records (carbon and oxygen stable isotope ratios, trace element abundances, growth laminae, and high precision Uranium/Thorium dating) from cave sites in central and southern Portugal. Resulting data will be combined and evaluated with similarly-resolved hydroclimate-sensitive records from northern Iberia (Spain) and northwest Africa (Morocco), creating a latitudinal transect that will allow spatial and temporal constraints to be placed on the Azores High. This research could also provide a significant spatial bridge between the only existing high-resolution paleo-hydroclimatic reconstructions (northern Morocco and northern Spain) from this zone. Together, these time series will allow for a more comprehensive evaluation of dynamical changes in the regional climate system through time. This project could transform the understanding of the nature and drivers of past Iberian hydroclimate variability, and how it may respond to future anthropogenic forcing. The development and synthesis of these high resolution and precisely dated records will be of value to the broad climate/paleoclimate communities.

NEW AWARDS

Continued



[TOP] The Riverkeeper boat at Lock 7 on the Mohawk River in Niskayuna, NY. Professor Mason Stahl took a reconnaissance trip to potential sampling sites. Image courtesy of Dr. Mason Stahl. [RIGHT] During his time at Union College, ALLEX Foundation Chinese Language Fellow, Ming I Chang, has hosted both a Mid-Autumn Festival and board game night at the language center. Image courtesy of Ming I Chang.

Carbon Cycling at River Confluences

THE BENDER SCIENTIFIC FUND OF THE COMMUNITY FOUNDATION FOR THE GREATER CAPITAL REGION

PROJECT PERSONNEL:

Principal Investigator **Dr. Mason Stahl** (Geology)

ABSTRACT:

River systems transport large quantities of organic carbon (OC) (e.g., plant matter, animal/human waste, and many industrial pollutants) in both particulate and dissolved forms. The rate and extent of degradation of these products into inorganic carbon (CO₂) is strongly influenced by the availability of nutrients and the microbial communities present in the water. Understanding these factors which exert control on the carbon cycle within rivers is important from both a water quality and global carbon cycle perspective. For example, enhanced rates of organic carbon degradation can have wide-ranging effects, from improving the removal efficiency of chemical pollutants in river water to increasing rates of carbon dioxide input into the atmosphere. At the confluence of two rivers, waters with differing chemistry and biology mix together, which is likely to affect the degradation of the OC in this mixed water. Researchers will collect samples on the Mohawk and Hudson Rivers and conduct chemical and microbiological analyses along with laboratory experiments to characterize the influence of river mixing on the consumption of OC. Importantly, this project will add to the understanding of the geochemistry and microbiology of the Mohawk and Hudson Rivers, which are regionally important water resources.

Chinese Language Teaching Fellow

THE ALLEX FOUNDATION

PROJECT PERSONNEL:

Project Director **Dr. Zhen Zhang** (Modern Languages & Literatures)

ABSTRACT:

The ALLEX Teaching Fellow Program allows an institution to augment and enrich its language course offerings in Chinese, Japanese, and Korean. The ALLEX Teaching Fellow will serve as a crucial participant in Union's Chinese language program, offering additional language practice for students, as well as seamlessly linking the classroom with the community, especially the Chinese-speaking community on campus. The Fellow will increase students' access to Chinese culture, products, and beliefs, as well as assist students in making connections across academic disciplines, such as environmental sustainability for environmental science students, and China's global relations with Latin America or Africa for political science or economics students.



Computer Engineering Course and Curriculum Development: Fulbright Fellowship in Sri Lanka

INSTITUTE OF INTERNATIONAL EDUCATION – COUNCIL FOR INTERNATIONAL EDUCATION

PROJECT PERSONNEL:

Fulbright Fellow **Dr. Cherrice Traver** (Electrical, Computer & Biomedical Engineering)

ABSTRACT:

Through the Fulbright U.S. Scholar award, Dr. Cherrice Traver will collaborate with the Department of Electrical and Information Engineering (DEIE) at the University of Ruhuna in Sri Lanka to implement a new degree program in "Computer and Electronics Engineering". Dr. Traver will use her academic background in engineering education and in the specific area of computer engineering to teach relevant courses, introduce interactive pedagogies, and develop new practical experience in the areas of embedded systems, computer architecture, and digital design. Her experiences as an ABET Program Evaluator, leadership as Union's former Dean of Engineering, and contributions as former Chair of the Electrical and Computer Engineering Department at Union position her well to facilitate the curriculum design and accreditation process of the new degree program.

NEW AWARDS

Continued



EDGE

The 2017 EDGE summer program participants on one of their invaluable field trips where they are able to view engineering design work from the drawing board to the production floor. Image courtesy of the EDGE program.

Davis United World College Scholars

THE SHELBY M.C. DAVIS CHARITABLE FUND

PROJECT PERSONNEL:

Associate Dean and Director of International Admissions **Nicole Buenzli** (Admissions) and Senior Associate Dean **Susan Hanks** (Admissions)

ABSTRACT:

Union will welcome its newest Davis United World College (UWC) Scholar to campus for the 2018-19 academic year. UWC Scholars are exceptional young people who have graduated from a UWC school and have then matriculated at select U.S. colleges or universities. The UWC experience – which brings students from around the world to live and learn together in one of 16 locations on five continents—has challenged them academically and personally, expanded their horizons exponentially, and shown them how to build understanding from diversity. The UWC Scholars program objective is to advance international understanding through education. The program is built on two assumptions: 1) that promising future leaders from a broad range of cultures should be afforded greater educational opportunities and serve to accelerate global networking; and 2) that these educational opportunities take place at leading U.S. colleges and universities, including Union College, in the belief that these schools in the U.S. will become more effective learning communities for all their students by becoming more internationally diverse and globally engaged.

Educating Girls for Engineering

GENERAL ELECTRIC

GLOBALFOUNDRIES

THE AMERICAN SOCIETY OF CIVIL ENGINEERS – MOHAWK-HUDSON CHAPTER

THE FOUNDATION FOR ENGINEERING EDUCATION

PROJECT PERSONNEL:

Program Director **Dr. Cherrice Traver** (Electrical, Computer & Biomedical Engineering)

ABSTRACT:

Union's Educating Girls for Engineering (EDGE) program is a pre-college educational enrichment experience that combines real-life college learning experiences with activities intended to interest women high school students in studying engineering and science in college and undertaking a career in one of those disciplines. More broadly, EDGE is designed to redress the serious and continuing underrepresentation of women in engineering by illustrating the humanitarian aspects of the discipline. Each summer, around 20 high school students take part in a project-oriented engineering program. The unifying theme of the program is "Toys and Tools for Children with Special Needs". EDGE participants visit a local school for students with special needs. Following the visit, participants return to the classroom to learn how to apply engineering design processes to adapt toys and tools for use by children with special needs. EDGE participants are introduced to various career options in engineering disciplines and a college experience at Union College. EDGE participants will take three mini-courses, several off-campus field trips to see engineering design at work, and tours of several of the innovative engineering facilities in Upstate New York. Takeaways from the program include using engineering design principles; using a computer to develop robotic techniques for communication; and enhancing technical writing and oral presentation skills.

Engineering Ambassadors Network

GENERAL ELECTRIC

PROJECT PERSONNEL:

Program Director **Dr. Shane Cotter** (Electrical, Computer & Biomedical Engineering)

ABSTRACT:

Union College students involved in the Engineering Ambassadors Network (EAN) participate in outreach events designed to engage middle and high school students. EAN is a collaboration of engineering students from across universities who are dedicated to changing the conversation and perceptions middle and high school students have about engineering. The EAN originated at Pennsylvania State University, and a grant from the National Science Foundation supports international workshops designed to enable students to enhance EAN programs at each institution. EAN serves the need for strong future leaders in engineering and supports a diverse future generation of engineers.

NEW AWARDS

Continued

In the Mirror: Functional Appreciated Bodies (IM FAB): Piloting an Easily Disseminable Primary Prevention Program

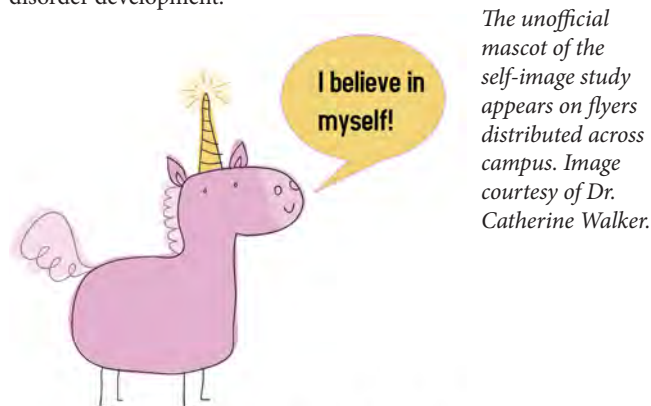
NATIONAL EATING DISORDER ASSOCIATION

PROJECT PERSONNEL:

Principal Investigator **Dr. D. Catherine Walker** (Psychology)

ABSTRACT:

This project aims to examine the concept of promoting attention toward body functionality and gratitude by using a weekly functionality-based mirror exposure and body functionality gratitude “journaling” text prompts. Throughout the course of three weeks, the researchers will examine whether this helps foster positive body image and decrease eating disorder symptoms in a sample of undergraduate females, a population at particularly high risk of body image dissatisfaction and consequent eating disorder development.



Join Our Self-Image Study!

International Ancient Greek Reading Group on Friendship in Aristotle's Nicomachean Ethics

CENTRAL NEW YORK HUMANITIES CORRIDOR

PROJECT PERSONNEL:

Project Director **Dr. Krisanna Scheiter** (Philosophy)

ABSTRACT:

The goal of this workshop is to engage in a close reading of Aristotle's Nicomachean Ethics, with this grant focusing specifically on Aristotle's account of friendship in Ethics. Reading groups like these allow the academic community to convene and collectively work through a piece of text together, which is an incredibly important practice for historians of philosophy. The reading group will bring together junior and senior faculty, from the United States and internationally, to catalyze professional collaborations spanning the world.

[RIGHT] Participants of the international ancient greek reading group on friendship in Aristotle's Nicomachean Ethics hosted at Union College. Images courtesy of Dr. Krisanna Scheiter.



Undergraduate researchers Nicholas Wright '21 (left) and Emily Caruso '21 (right) hold the microplastics sampling net in the Hans Groot Kill during a rainstorm in June 2018. Image courtesy of Dr. Jacqueline Smith.

Investigation of Microplastic Pollution in Tributaries of the Mohawk River

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Jacqueline Smith** (Geology)

ABSTRACT:

This project is a continuation of a Mohawk River Basin Program third round grant that demonstrated that while microplastic pollution is pervasive in the Mohawk River, the specific sources of the pollution remain unclear. This project will focus on clarifying the role of tributaries in delivering microplastics to the Mohawk River and will involve collecting samples of river water from tributaries along the length of the Mohawk River and quantifying the microplastic load from each tributary.

Minerva Fellows Program

THE HERMAN GOLDMAN FOUNDATION

ABSTRACT:

The Minerva Fellows Program advances Union's mission by exposing recent Union graduates to the human side of poverty and by teaching them to harness their entrepreneurial skills and talents for lasting, positive impact. While many students care deeply about those who are less fortunate, they know little about the opportunities that exist to help. This program provides the opportunity to make a difference. While some Minerva Fellows become social entrepreneurs who devote their careers to finding innovative ways to eradicate poverty or improve conditions in the developing world, many will return to a conventional career path. Regardless of the path they choose, their experience as a Minerva Fellow changes each of them forever – they become global citizens.



NEW AWARDS

Continued

Project for Peace: Stitching Talents

THE SHELBY C. DAVIS CHARITABLE FUND

ABSTRACT:

Projects for Peace is an initiative for undergraduate students currently enrolled at one of the participating Davis United World College Scholars Program partner schools. Projects for Peace awardees design a grassroots project – anywhere in the world – which promotes peace and addresses the root causes of conflict among parties. Emmanuela (Ella) Oppong '19 developed the project Stitching Talents, which sought to construct a vocational school in her native Ghana that will offer a free and alternative education where students can acquire hands-on skills that can help generate future income. Students will learn to tailor, crochet, knit, print and dye cloth, and make shoes among other valuable skills. The Stitching Talents vocational school was built on the site of Egyam Children's Home, an orphanage that serves approximately 80 students. Unlike most vocational schools in Ghana, Stitching Talents offers free admission. During her time in Ghana, Ella also taught courses in sexual health, math, English, and computer science to students and she plans on initiating an SAT prep program, enabling students to study for and take the SATs and apply to schools in the US.



[TOP LEFT] Construction of the Stitching Talents vocational school. [TOP RIGHT] Emmanuela Oppong, Projects for Peace awardee. Images courtesy of Emmanuela Oppong. [BOTTOM] Union College SUCCESS Scholar and Student Forum President Michael Stalteri '19 delivers remarks at the Union College Founders Day Convocation on February, 21, 2019. Photograph by Shawn LeChapelle.

Russian Language Teaching Assistant

THE INSTITUTE OF INTERNATIONAL EDUCATION

PROJECT PERSONNEL:

Program Director **Dr. Kristin Bidoshi** (Modern Languages & Literatures)

ABSTRACT:

The Fulbright Foreign Language Teaching Assistant (FLTA) program helps bolster Union's rapidly growing Russian language and Russia & East European Studies programs by offering an increased international presence and diversity in language and cultural programming. The FLTA assists in first and second year language courses, leads practice sessions, offers guided conversational activities, and serves as a tutor. The teaching assistant actively participates in Language Table and Russian Language Club meetings while engaging in campus life, offering Union students further informal practice in everyday conversation.

SUCCESS-LEADERS: Leading Educational and Academic Directions to Enhance Retention in STEM

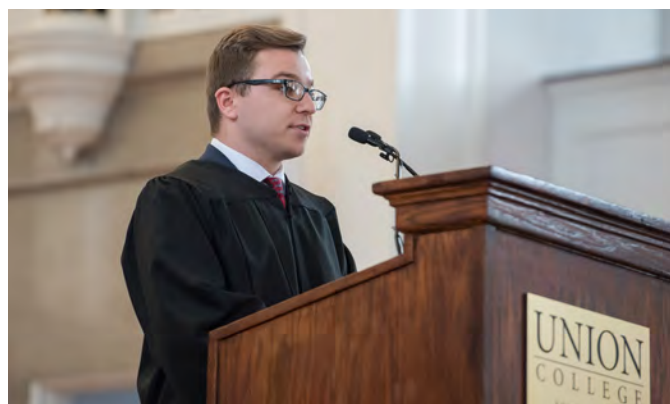
THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Joanne Kehlbeck** (Chemistry); Co-PI **Dr. David Cotter** (Sociology); Senior Personnel **Dr. Samuel Amanuel** (Physics & Astronomy), **Dr. Ronald Bucinell** (Mechanical Engineering), **Dr. Palmyra Catravas** (Electrical, Computer & Biomedical Engineering), **Dr. Holli Frey** (Geology), **Dr. Michael Hagerman** (Chemistry), **Dr. Laura MacManus-Spencer** (Chemistry), **Matthew Malatesta** (Vice President for Admissions, Financial Aid and Enrollment), and Undergraduate Research Director **Dr. Chad Orzel** (Physics & Astronomy)

ABSTRACT:

The SUCCESS-LEADERS grant continues Union's longstanding history of success with NSF STEM education initiatives. The project aims to develop, refine, and implement practices that can be easily translated and adapted to the entire institution and other institutions, as well as advance understanding of factors affecting retention and career pathways of low-income, at-risk populations. Funded by the NSF Scholarships in STEM (S-STEM) Program, activities supported through this new Track 2 award will: increase the number of applications and admissions from academically-talented students from under-resourced, rural high schools; will improve the retention rates and success of these students in the STEM fields by addressing the unique challenges they face; increase the number of women in engineering, physics, mathematics, and computer science and increase the number of underrepresented groups in all STEM fields; enhance their education through early introduction to research opportunities, connections to industry and internships, study abroad and leadership training; and improve undergraduate educational experiences and promote professional advancement by facilitating fruitful mentoring relationships that seek to address areas of attrition in STEM. Co-PI Cotter will lead a retrospective, longitudinal study of the prior NSF-funded scholars at Union, along with the new SUCCESS-LEADERS cohorts that will arrive on campus in the Fall of 2018 and Fall of 2019, to assess the long range impacts of the elements that have been refined through this initiative designed to retain at-risk populations.



NEW AWARDS

Continued

The 2018 Beckman Scholars Program

THE ARNOLD AND MABEL BECKMAN FOUNDATION

PROJECT PERSONNEL:

Faculty Mentors **Dr. Cay Anderson-Hanley** (Psychology), **Dr. Mary Carroll** (Chemistry), **Dr. Leo Fleishman** (Biology), **Dr. Kristin Fox** (Chemistry), **Dr. Michael Hagerman** (Chemistry), **Dr. Joanne Kehlbeck** (Chemistry), **Dr. Scott Kirkton** (Biology), **Dr. Laura MacManus-Spencer** (Chemistry), and **Dr. Roman Yukilevich** (Biology); Undergraduate Research Director **Dr. Chad Orzel** (Physics & Astronomy)

ABSTRACT:

This award from the Arnold and Mabel Beckman Foundation provides an in-depth, sustained undergraduate research experience for exceptionally talented students at four-year colleges and universities. Students will spend two summers and a full academic year working on a research project with a faculty mentor. Beckman Scholars are expected to participate in a professional or scientific meeting, establish connections through the College's alumni network, and attend the Beckman Scholars Symposium in Irvine, CA.



Charlotte Mineo '21 was named as Union's first Beckman Scholar, under the mentorship of Professor Kristin Fox. Charlotte attended the Experimental Biology interdisciplinary meeting in San Diego, CA in April 2018. Image courtesy of Dr. Kristin Fox.

The American Sound: Modernism and Eclecticism

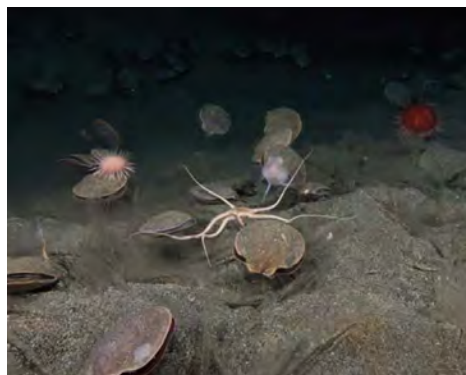
THE NATIONAL ENDOWMENT FOR THE ARTS

PROJECT PERSONNEL:

Artistic Director **Derek Delaney** (Union College Concert Series)

ABSTRACT:

The American Sound: Modernism and Eclecticism features recent works and a first-of-its-kind Union-commissioned piece by some of today's leading American composers, highlighting their roots to important works of the early part of the 20th century. The project features renowned and emerging American musicians including: violinist Jennifer Koh with pianist Shai Wosner; violinist Stefan Jackiw and pianist Jeremy Denk; violinist Soovin Kim (New England Conservatory faculty), cellist Paul Watkins (Emerson Quartet), and pianist Gloria Chien (CMS of Lincoln Center); the Brentano Quartet (Yale's quartet-in-residence); and Curtis flutist Emma Resmini (resident at Minnesota Public Radio). The American Sound featured the Concert Series' first commissioned work. MacArthur grant-winning composer Matthew Aucoin composed a string quartet entitled "Soft Power" premiered by the Brentano Quartet and was dedicated to Union's 18th President Stephen Ainlay and Judith Garner Ainlay.



*Benthic ecosystems under sea ice depicting the Antarctic Scallop, *Adamussium colbecki*, Explorers Cove, Antarctica. Shell heights are about 8-10 cm. Photograph by Shawn Harper.*

The Antarctic Scallop as a Key to Paleoenvironments and Sea Ice Conditions: Understanding the Modern to Predict the Past

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. David Gillikin** (Geology)

ABSTRACT:

This project aims to discover whether the Antarctic scallop, *Adamussium colbecki*, provides a guide to sea-ice conditions in nearshore Antarctica today and in the past. Scallops may grow slower and live longer in habitats where sea ice persists for many years, limited by food, compared to habitats where sea ice melts out annually. The chemicals retained in the shell during growth may provide crucial habitat information related to not only changing sea-ice conditions but also the type of food, whether it is recycled from the seafloor or produced by algae blooming when sea ice has melted. Unlocking the ecological imprint captured within the shell of the Antarctic Scallop will increase the understanding of changing sea-ice conditions in Antarctica. Further, because the Antarctic scallop had relatives living at the time when the Antarctic ice sheet first appeared, the scallop shell record may contain information on the stability of the ice sheet and the history of Antarctic shallow seas. This project will also be integral for training a new generation of geoscientists in fossil and chemical forensics related to shallow sea habitats in Antarctica.

The Concert Series' first ever commissioned work by MacArthur grant-winning composer Matthew Aucoin - a string quartet entitled "Soft Power" - was premiered by the Brentano Quartet in April 2018. Image courtesy of Derek Delaney.



NEW AWARDS

Continued

The Integrated Science & Engineering Complex

GEORGE I. ALDEN TRUST
J. M. McDONALD FOUNDATION

ABSTRACT:

These grants support the renovation and expansion of its Science and Engineering Center (S&E) to construct the new 142,000 sq. ft. Integrated Science and Engineering Complex (ISEC). The project broke ground in spring 2017 launching the first phase of the project – a magnificent new building largely devoted to leading-edge laboratories. The new addition was completed in the summer of 2018 and at the start of the fall term we welcomed students back to campus and opened the doors of the new addition to ISEC, dedicated as the Stephen Charles Ainlay and Judith Gardner Ainlay Hall. The new facility is designed to enrich curricular experiences with state-of-the-art classrooms, sophisticated research laboratories, and collaborative learning spaces for students and faculty. The contiguous departmental floor plans will allow for cross-fertilization among sub-disciplines, improved research collaborations, and increased opportunities to mentor students and provide opportunities for critical research training. The second phase of the project is well underway to renovate, improve, and modernize the spaces and infrastructure of the original S&E buildings. When completed in fall of 2019, ISEC will house nine existing departments of science and engineering: biological sciences; chemistry; computer science; geology; electrical, computer, and biomedical engineering; mathematics; mechanical engineering; physics and astronomy; and psychology, featuring cutting edge laboratories, classrooms, faculty offices, and collaborative learning spaces. The complex will also be the home to a number of interdisciplinary studies program that cross the boundaries of these departments including nanoscience and neuroscience.

The Photographs of William James Stillman: Catalogue of the Union College Collection

THE TERRA FOUNDATION FOR AMERICAN ART –
THE AMERICAN ACADEMY IN ROME

PROJECT PERSONNEL:

Fellow **Dr. David Ogawa** (Visual Arts)

ABSTRACT:

Dr. David Ogawa, the winner of the inaugural Terra Foundation Affiliated Fellowship in Rome, will conduct research on the 19th-century photographer William James Stillman at the American Academic in Rome. The primary goal of the project is a complete catalogue of Stillman's photographic albums, with an interpretive essay that locates them in an integrated way into the context of Stillman's work as an archaeologist, classicist, and contemporary journalist. This work is important to understanding the photographs but also to tease out the relationship between Stillman's photographs and 19th century archaeological practices and art documentation, especially in the context of Rome in the first two decades after Italian unification.

Translation and Accretion of the Yakutat Microplate and Prince William Terrane, Alaska

KECK GEOLOGY CONSORTIUM
THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. John Garver** (Geology)

ABSTRACT:

The North American Cordillera was assembled through the formation, accretion, and translation of a number of terranes and much of this assembly has occurred since the Cretaceous period. Since this time, most of the terrane translation was northward due to the relative motion of Pacific plates with North America. Despite decades of investigations on terrane movement and translation much remains unknown about where these terranes originated and how far they traveled before becoming part of the amalgamation of terranes in Alaska. This project brings new analytical techniques to bear on this problem focusing on the Yakutat terrane, which is now colliding with southern Alaska driving the uplift of the Chugach Range. This research tests the idea that the Yakutat terrane originated far to the south in the Pacific Northwest and moved parallel to the continental margin before colliding with southern Alaska. This project will advance desired societal outcomes by participation of students from underrepresented minorities in STEM, increase public scientific literacy and public engagement with STEM through the development of brochures for the National Parks and National Forests, and the development of a diverse, globally competitive STEM workforce through active participation of undergraduate students in research at primarily undergraduate institutions.



Will Fisher '19 (Union College) and Nicholas Gross Almonte '19 (Carleton College) spend an afternoon looking at the Chugach rocks on the Turnagain Arm of the Cook inlet as part of a Keck Geology Consortium geology project in Prince William Sound. The team is led by Professor John Garver (Union College) and Professor Cameron Davidson (Carleton College). Image courtesy of Dr. John Garver.

NEW AWARDS

Continued

Undergraduate Summer Research Innovation Fellowships and Internships

STANLEY BLACK & DECKER

PROJECT PERSONNEL:

Undergraduate Research Director **Dr. Chad Orzel** (Physics & Astronomy)

ABSTRACT:

The breadth and depth Union students possess from the combination of their liberal arts background and the expertise they gain from the academic rigor of their specific discipline make them well rounded and valuable interns and future employees. The Stanley Black & Decker Undergraduate Summer Research Innovation Fellowships will fund summer research fellows investigating topics around the themes of: 1) Manufacturing 4.0 and 2) How Will Residential Energy Services Change in the Next 10 Years. Stanley Black & Decker will also host on-site innovation interns. On-site interns will have the hands-on experience of learning design and research processes in a corporate environment; will have the opportunity to see different components of the company; and will even undergo tools and equipment training. Innovation interns will see ideas in stages from initial conception to implementation.

Undergraduate Summer Research Fellow

GLOBALFOUNDRIES

PROJECT PERSONNEL:

Undergraduate Research Director **Dr. Chad Orzel** (Physics & Astronomy)

ABSTRACT:

Undergraduate research is an integral part of Union's curriculum and is key to cultivating and retaining student interest in STEM fields. Through a competitive selection process, the GLOBALFOUNDRIES Undergraduate Summer Research Fellow will conduct original research for eight weeks during the summer with a faculty member. The Summer Research Fellow will have the opportunity to present their work to the Senior Vice President and General Manager for GLOBALFOUNDRIES US Fab Operations and a team of GLOBALFOUNDRIES researchers who will ask stimulating questions and provide feedback to the student researcher. Undergraduate research provides opportunities for students to develop a critical understanding of their field through learning the current state of knowledge, gain experience and confidence in knowing when and how to ask the right questions to solve difficult problems, and students often have the satisfying experience of coauthoring publications and delivering papers at conferences. Our students present their work at annual meetings of professional societies including The American Chemical Society, ASME International Mechanical Engineering Congress & Exposition, American Physical Society, and the Materials Research Society.

Union College Space Grant

NASA – NEW YORK SPACE GRANT

PROJECT PERSONNEL:

Principal Investigator **Dr. Rebecca Koopmann** (Physics & Astronomy)

ABSTRACT:

The New York Space Grant program supports summer research projects, student travel to conferences, and a student outreach team. The research objectives for students who participate in the summer research program are threefold: 1) to participate in a STEM research project during the summer; 2) to engage in the summer seminar program; and 3) to present their findings at a local, regional or national conference. Outreach activities will include partnering with Union's Kenney Community Center to reach out to the local secondary schools to host the Union College Physical Constants Workshop for high school physics teachers and students. Teachers and students from regional high schools work in teams with Union physics and astronomy faculty and advanced undergraduates to perform experiments, gaining experience with modern instrumentation and laboratory techniques such as high-resolution video analysis, scattering experiments with a particle accelerator and scanning electron microscopy.

W. Howard Wright Scholars

THE WRIGHT FAMILY FOUNDATION

ABSTRACT:

The W. Howard Wright Scholarship supports four outstanding, full-time undergraduate students majoring in Mechanical Engineering.



Undergraduate research fellow, Aaron Rapaport '20 presented his project "The Manufacture of Solar Energy Devices by Inkjet Printing" at GLOBALFOUNDRIES in September 2018. Aaron's research was under the direction of Professor Michael Hagerman. Image courtesy of Aaron Rapaport.

ACTIVE GRANTS

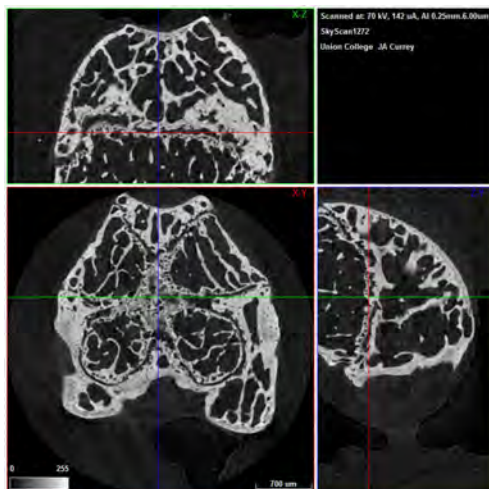


Image of a mouse femoral condyle in the frontal (top), transverse (bottom left), and sagittal (bottom right) planes. In the transverse image, you can see the four leaf clover appearance of the growth plate. Image courtesy of Dr. Jennifer Currey.

Acquisition of a High-Resolution Micro-Computed Tomography System for Multidisciplinary STEM Research and Undergraduate Training

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Scott Kirkton (Biology)**; Co-PIs **Dr. Jennifer Currey (Biomedical Engineering)**, **Dr. Leo Fleishman (Biology)**, **Dr. Robert Olberg (Biology)**, and **Dr. John Rieffel (Computer Science)**; Senior Personnel **Dr. David Hodgson (Mechanical Engineering)**, **Dr. Steven Rice (Biology)**, and **Dr. Nicole Theodosiou (Biology)**

ABSTRACT:

Union College biology, computer science, and engineering faculty have developed collaborative and integrative research across diverse STEM fields to understand how structural properties at one level of organization affect organismal function at another. The micro-computed tomography (μ CT) system enables researchers to nondestructively visualize complex internal anatomy and provide insight into how organismal structures: 1) impact developmental physiology; 2) respond to external mechanical stimuli during bone fracture healing; 3) lead to speciation through visual communication; 4) inform development of biomimetic soft robots; 5) support the evolution of morphogenesis; and 6) explain water balance in plants critical to the global carbon cycle. This project will enhance both multidisciplinary and interdisciplinary STEM research at Union College that will increase student interest in pursuing graduate STEM study and improve the scientific and technical research infrastructure of our country. The new μ CT system was installed in spring of 2016, and since that time twenty undergraduates have been trained to use the instrumentation, as well as collaborators from Providence College, Rensselaer Polytechnic Institute, and a Union College mechanical engineering faculty member. The SkyScan 1272 is currently used to collect a variety of data for multiple research projects. To date, μ CT data has been used in seven posters for national meetings, eight posters for the Union College undergraduate research symposium, contributed to two published manuscripts, and is the basis for a manuscript currently under secondary review.

Acquisition of a Multi-Material 3D Printer to Enable Novel Multi-disciplinary Research and Research Training

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. John Rieffel (Computer Science)**; Co-PIs **Dr. Ann Anderson (Mechanical Engineering)** and **Dr. Steven Rice (Biology)**; Senior Personnel **Dr. Takashi Buma (Electrical, Computer & Biomedical Engineering)**, **Dr. Michael Hagerman (Chemistry)**, and **Dr. Robert Olberg (Biology)**

ABSTRACT:

By harnessing a huge demand for prototyping technologies, researchers will launch a new era of innovative research, with applications ranging from the neuromechanics of dragonfly capture to the manufacture of novel aerogel coated surfaces to the design of completely soft robots. This 3D printer is the centerpiece of Union's Collaborative Design Studio (UCDS), and serves as the foundation of an inherently cross-disciplinary and highly collaborative research program. Providing a common space in which community members can design solutions and solve problems together helps foster and spark spontaneous interdisciplinary collaborations. Students using the space are emboldened as craftspeople and enabled as entrepreneurs. Not only does this acquisition help set the standard for the integration of rapid prototyping techniques into undergraduate research and teaching, it provides tools, methods, and environments around which tomorrow's designers will coalesce and thrive.

Alpine Conference on Algebraic and Applied Topology

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Brenda Johnson (Mathematics)**

ABSTRACT:

The Alpine Conference on Algebraic and Applied Topology took place August 15th through August 21st, 2016 in Saas-Almagell, Switzerland. The conference brought together experts in both the theoretical aspects of algebraic topology and the growing range of scientific applications of topology. The program consisted of lectures by the invited plenary speakers, together with contributed talks from other conference participants. The plenary speakers informed participants about recent advances in their fields, and provided insight into possible directions for future work. All participants had the opportunity to discuss their work with and receive feedback from others experts in the field, to continue existing and form new collaborations, and to learn more about potentially useful tools and techniques outside their areas of expertise. This award ensured that the US algebraic topology community was well-represented at this important conference, and, in particular, that early-career topologists from the US had the opportunity to participate.

ACTIVE GRANTS

Continued

ANTE – A Four-Tier Framework to Boost Visual Literacy for High Dimensional Data

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Kristina Striegnitz** (Computer Science)

ABSTRACT:

With the massive availability of data, the need to understand and be comfortable with data has gained increasing importance. There is now a great demand for individuals that have the skills to extract meaning from data. While academic programs in data science are being created, going back to school to formally study this topic is not possible for a large segment of the population. Not everyone needs to become a formal data scientist to be competitive in this increasingly data-centric society and workplace, but it is of great benefit to become more data literate. Visualizations, such as bar charts, line plots, maps, etc., are helpful in explaining data. However, today's data sets often combine many different kinds of information and are, therefore, too complex to be represented with these basic visualizations. The goal of this project is to develop a visualization system that can represent data in such a way that a user can make sense of complex data without extensive training. This will involve advances in visualization techniques as well as novel approaches to presenting visualizations in an engaging way. The ANTE (Appeal, Narrate, Transform, Engage) system developed in this project has the potential to help increase the ability of citizens to become more knowledgeable participants in an increasingly data-centric society. The project provides research training for graduate students at SUNY Stony Brook and undergraduate students at Union College. The visualization tools and games will make an excellent environment for teaching both data and visual literacy, at all education levels.



Junya Yoshino, the ALLEX Foundation Japanese Language Teaching Fellow for the 2017-18 academic year, prepared various Japanese games and snacks to introduce the Union community to Japanese culture at the International Festival. Image courtesy of Junya Yoshino.

Care and Support in Aging Communities

(CO-) SPONSORED BY THE NEW YORK SIX LIBERAL ARTS CONSORTIUM, FROM AN AWARD BY THE ANDREW W. MELLON FOUNDATION

PROJECT PERSONNEL:

Principal Organizer **Dr. Carol Weisse** (Psychology); Research Mentors **Dr. Cay Anderson-Hanley** (Psychology) and **Dr. David Cotter** (Sociology)

ABSTRACT:

This project focuses on access to end-of-life housing, support, and palliative and hospice care. As more individuals live into older ages, the ways in which modern society either integrates aged individuals and addresses their particular experiences and needs, or fails to, represents an important human rights issue. If, as an aging society, we do not consider the many issues and inequities that exist around integration, quality of life, and care for the aging, our social institutions and norms will be increasingly mismatched to a growing proportion of the population. The members of this project hope to investigate the challenges presented by an aging society in order to enrich their teaching and research, with a broader goal to understand the factors that make communities more 'livable' and contribute to integrated aging.

Chinese and Japanese Language Teaching Fellows

THE ALLEX FOUNDATION

PROJECT PERSONNEL:

Project Directors **Dr. Junko Ueno** (Modern Languages & Literatures) and **Dr. Zhen Zhang** (Modern Languages & Literatures)

ABSTRACT:

The ALLEX Teaching Fellow Program enables colleges and universities to begin or maintain a high quality Chinese or Japanese language program by providing them with professionally trained, native Chinese, Japanese, or Korean instructors. Union College will host Chinese and Japanese language fellows, both having recently completed ALLEX's intensive summer training program emphasizing the teaching of Chinese and Japanese specifically to native-English speakers. This is a perspective rarely studied by language teachers trained in Asia, where most language students are from nearby Asian countries and have very different language backgrounds from students in the American university classroom. The fellows serve as a crucial participant in Union's Chinese and Japanese language programs, offering additional language practice for students, as well as sustaining the core values of the American Council on the Teaching of Foreign Languages (ACTFL) Standards by seamlessly linking the classroom with the community, especially the Chinese-speaking and Japanese-speaking communities on campus. The fellows will increase students' access to Chinese and Japanese cultures, products, and beliefs, as well as assist Union students in making connections across the various academic disciplines.

ACTIVE GRANTS

Continued

Cognitive Benefits of Interactive Mental and Physical Exercise for MCI

THE NATIONAL INSTITUTES OF HEALTH

PROJECT PERSONNEL:

Principal Investigator **Dr. Cay Anderson-Hanley** (Psychology); Key Personnel **Dr. Kristina Striegnitz** (Computer Science)

ABSTRACT:

The primary goal of this research project is to replicate and extend the recently concluded randomized clinical trial (RCT) investigating interactive physical and mental exercise, “Cybercycling for Cognitive Health” (Anderson-Hanley et al., 2012a). This project extends the research to persons with mild cognitive impairment (MCI) to examine the generalizability of the above finding to those already experiencing cognitive decline, with the hypothesis that cybercycling can slow decline more than either physical or mental exercise alone.

Conservation of Théodore Olivier’s 1850’s String Geometric Models

GREATER HUDSON HERITAGE NETWORK

PROJECT PERSONNEL:

Curator of Art Collections and Exhibitions **Julie Lohnes** (Mandeville Gallery)

ABSTRACT:

This GHHN Conservation Treatment grant, made possible with public funds from the New York State Council on the Arts, supports the conservation of a selection of Théodore Olivier’s 1850’s string geometric models housed in the Union’s Permanent Collection. The work will be done by conservator Christine Puza. The College holds in its Permanent Collection the largest single group of Théodore Olivier’s string models used for demonstrating the relationships and intersections of geometric shapes in space. The models were made in Paris in the 1830s for French mathematician Théodore Olivier (1793-1853), who devised them to represent the intersections of 3D objects in his teaching of descriptive geometry. They are the first models of this type that are adjustable. Several of the Olivier models from the collection will be displayed in the 2018 exhibition, Probability and Uncertainty, at the Mandeville Gallery.



The Aerogel Laboratory in the Peter Irving Wold Center. Image courtesy of the Aerogel Team.

Deep Drilling of Lake Junin, Peru: Continuous Tropical Records of Glaciation, Climate Change and Magnetic Field Variations Spanning the Late Quaternary

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Donald Rodbell** (Geology); Senior Personnel **Dr. David Gillikin** (Geology)

ABSTRACT:

Our ability to understand the full complexity of climate change and forecast future regional trends requires that we extend the available instrumental records into the geologic past. Over the past several decades paleoclimatologists have developed myriad proxy indicators of past regional climate that are recorded in natural archives such as ice cores, cave deposits, and lake sediment, among many other archives. Proxy paleoclimate records from the tropics are particularly important because this region is the “heat engine” of Earth. Lake Junin is exceptional in the length of record that it contains, but also in the climate signals that it records. This research will develop these and other proxy climate records for the full length of recovered core; the records generated will comprise one of the longest continuous records of climate and environmental change from the inner tropics.

Development of Aerogel-based Window Systems

NEW YORK STATE ENERGY AND RESEARCH DEVELOPMENT AUTHORITY

PROJECT PERSONNEL:

Principal Investigators **Dr. Ann Anderson** (Mechanical Engineering and Sunthru, LLC), **Dr. Mary Carroll** (Chemistry and Sunthru, LLC); Co-PI **Dr. Bradford Bruno** (Mechanical Engineering)

ABSTRACT:

Sunthru, LLC is developing high performance, aerogel-based windows for use in commercial and residential buildings. The use of highly insulating window products has the potential to significantly reduce the energy costs associated with heating, cooling and indoor lighting. Aerogels are light-weight, highly insulating, highly translucent materials that are made using sol-gel methods. Union’s faculty researchers have successfully manufactured aerogel monoliths with excellent insulating properties and excellent visible light transmission. Sunthru, LLC will work with Union researchers to develop methods to scale up the size of the aerogel monolith using a larger hot press (at Automated Dynamics) to make realistic aerogel window prototypes. The overall goal of this work is to measure pressure and temperature conditions during rapid supercritical extraction (RSCE) processing, which will allow Sunthru to scale up to manufacture larger aerogel monoliths.

ACTIVE GRANTS

Continued

Diffusion in Iron-Nickel Alloys and Sulfides: Constraints on Segregation and Crystallization of Early Planetary Cores

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Heather Watson** (Physics & Astronomy)

ABSTRACT:

The segregation of a planet into a mantle and core is one of the most important and fundamental global processes, and can contribute to planet-wide attributes such as developing and sustaining a magnetic field which is a criterion for habitability. Iron meteorites are considered to be remnant cores of early proto-planets. Our picture of the earliest days of the Solar System depends crucially on accurate and precise dating of these objects that have survived since the beginning. This project aims to place important constraints on the information received from measuring radiometric ages of meteorites. In particular, researchers aim to constrain both the temperature and time at which the radiometric age signatures were emplaced by conducting experiments on meteoritic materials at the high temperatures and pressures characteristic of early planet formation. The experimental results will be used in conjunction with measured ages of meteorites to constrain models of the thermal histories of iron meteorite parent bodies.

Educating Girls for Engineering

GENERAL ELECTRIC

GLOBALFOUNDRIES

THE AMERICAN SOCIETY OF CIVIL ENGINEERS – MOHAWK-HUDSON CHAPTER

THE FOUNDATION FOR ENGINEERING EDUCATION

PROJECT PERSONNEL:

Project Director **Dr. Cherrice Traver** (Electrical, Computer & Biomedical Engineering)

ABSTRACT:

Union's Educating Girls for Engineering (EDGE) program is a pre-college educational enrichment experience that combines real-life college learning experiences with activities intended to interest women high school students in studying engineering and science in college and undertaking a career in one of those disciplines. More broadly, EDGE is designed to redress the serious and continuing underrepresentation of women in engineering by illustrating the humanitarian aspects of the discipline. Each summer, around 20 high school students take part in a project-oriented engineering program. The unifying theme of the program is "Toys and Tools for Children with Special Needs". EDGE participants visit a local school for students with special needs. Following the visit, participants return to the classroom to learn how to apply engineering design processes to adapt toys and tools for use by children with special needs. EDGE participants are introduced to various career options in engineering disciplines and a college experience at Union College. The program includes three mini-courses, several off-campus field trips to see engineering design at work, and tours of several of the innovative engineering facilities in the area.

Encounters with Circus and its Others

SOCIAL SCIENCES HUMANITIES RESEARCH COUNCIL OF CANADA

PROJECT PERSONNEL:

Principal Organizer **Dr. Charles Batson** (Modern Languages & Literatures)

ABSTRACT:

From Pink and Britney Spears' stage shows to American Horror Story to Cirque du Soleil's status as the world's most successful live performing arts company, circus in the early 21st century has undeniably gone mainstream. This positive news for circus companies, artists, and audiences with a taste for thrilling entertainment raises questions about circus's historic status as a site for celebration and exploitation of differences, from stagings of exceptional performing bodies to the display of "freakery." This project addresses these questions, focusing on what and whom have been targeted as different, as Other, in contemporary circus practice. We include questions of gender, sexuality, embodiment, ability/disability, ethnicity, class, and species. Encounters with Circus and Its Others proposes extended and multi-faceted engagement with these concerns via exchanges between scholars, circus artists and workers, and the public. The three-part series of "Encounters" were held in connection with the July 2016 iteration of Montréal Complètement Cirque (MCC) festival, whose collaboration, along with Cirque du Soleil and the National Circus School, will bring these conversations to a broad public.



The visual signature used for the conference "Encounters with Circus and its Others." Image courtesy of Dr. Charles Batson.

Engineering Ambassadors Network

GENERAL ELECTRIC

PROJECT PERSONNEL:

Faculty Advisor **Dr. Shane Cotter** (Electrical, Computer & Biomedical Engineering)

ABSTRACT:

Union College students involved in the Engineering Ambassadors Network (EAN) participate in outreach events designed to engage middle and high school students. EAN is a collaboration of engineering students from across universities who are dedicated to changing the conversation and perceptions middle and high school students have about engineering. The EAN originated at The Pennsylvania State University, and a grant from the National Science Foundation supports international workshops designed to enable students to enhance EAN programs at each institution. EAN serves the need for strong future leaders in engineering and supports a diverse future generation of engineers.

ACTIVE GRANTS

Continued

Enhancing Undergraduate Research Experiences through Extragalactic Radio Astronomy

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Rebecca Koopmann** (Physics & Astronomy)

ABSTRACT:

The Undergraduate ALFALFA Team (UAT) has provided research-based educational opportunities for 334 students closely collaborating with 33 Astronomy faculty from a diverse range of institutions across the country to carry out several related scientific programs that involve a radio survey of hydrogen in and around nearby galaxies. The activities include research projects, observing and workshops at Arecibo, Green Bank, and Kitt Peak National Observatories, and presentations at national conferences such as the American Astronomical Society. Undergraduates are involved in all aspects of the scientific program, including planning and carrying out the observations. They will attend an annual workshop at Green Bank Observatory, Arecibo Observatory, or Kitt Peak National Observatory. This program serves as a prime example of the value of scientific collaboration, particularly for faculty and students at isolated schools, and of the importance of research as a component of undergraduate education. This exposure to front-line astronomical research enhances the educational infrastructure and the quality of STEM at a large number of schools and has an even wider impact through the curriculum and outreach materials they produce and share, and through broadening the participation of groups underrepresented in STEM.

Global Learning Faculty Study Tours

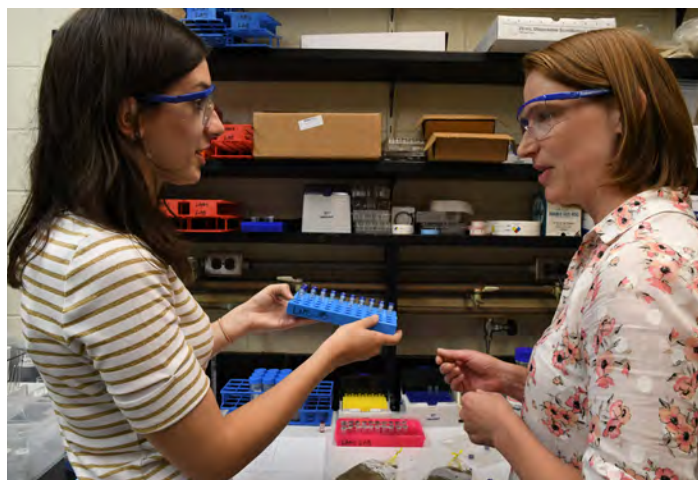
THE ANDREW W. MELLON FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Strom Thacker** (Stephen J. and Diane K. Ciesinski Dean of Faculty and Vice President for Academic Affairs) and Director of General Education **Dr. John Cramsie** (History)

ABSTRACT:

This Presidential Leadership Grant helped to enhance the curriculum through cross-disciplinary, global experiences for faculty. As part of the grant, 20 faculty members participated in two 10-day intensive international experiences that examined an interdisciplinary subject area of global import from disparate perspectives, such as STEM and the humanities. The first cohort of faculty traveled to China, while the second year's cohort traveled to Berlin. The faculty were engaged in preparatory discussions and readings, visited international locations linked to academic content, and shared ideas and intellectual connections. Upon their return, participants attended a campus retreat to integrate the experience into Union's curriculum. Using two foundational courses in the Common Curriculum, First-Year Preceptorial (with its emphasis on critical reading or writing) and the Sophomore Research Seminar (with its focus on research practices), faculty worked to develop new courses or redevelop existing ones around content inspired by the trip.



Professor Laura MacManus-Spencer and Anna Mahony '20 discuss the preparation of samples to study the concentrations of per- and polyfluoroalkyl substances in contaminated water and soil samples. Photograph by Michael Farrell.

Groundwater Contamination in the Northeast: Improving STEM Education by Demonstrating How Science Matters

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Laura MacManus-Spencer** (Chemistry)

ABSTRACT:

In 2014, the chemical Perfluorooctanoic Acid (C8 or PFOA) was discovered in the public drinking water in the Village of Hoosick Falls, NY. As concern over this discovery grew, other communities began testing their water for PFOA. As of October 2016, PFOA has been discovered in unsafe concentrations in the groundwater of Eagle Bridge and Petersburg, NY, Merrimack, NH, and in Bennington, North Bennington, and Pownal, VT. In response, select science courses at Bennington College and Union College will be redesigned in conversation with this unfolding contamination event. In these courses, undergraduate students will be trained in chemistry, geology, and environmental studies and equipped to apply that training in the production of independent data on a disaster in real-time. The project will craft new curriculum and teaching modules aimed at incorporating local environmental problems into science curriculum, as well as new methods for assessing the educational impact of doing so. The educational data produced by this project promises to inform and improve existing science curriculum at Bennington College and Union College as well as offer insights about what works in STEM education on a liberal arts campus more generally. This project will also produce key data on changing levels of PFOA in groundwater and regional soils that will provide a much-needed independent characterization of the contamination plume. This project, then, will showcase the civic value of an education in science for diverse undergraduate students and the local community.

ACTIVE GRANTS

Continued

Hazards in the Caribbean: The History of Magma Chambers, Eruptions, Landslides, Streams, and Fumeroles in Dominica

KECK GEOLOGY CONSORTIUM
THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Holli Frey** (Geology)

ABSTRACT:

The Caribbean has been the site of significant historic volcanism, from the ongoing eruptions in Montserrat to the devastating eruptions of Mt. Pelee, Martinique (~ 32, 000 fatalities), and Soufriere, St. Vincent in 1902 (~1,500 fatalities). However, the island with the most volcanic hazard risk is Dominica, which experienced the largest explosive eruption in the Caribbean in the last 200 kyr, features nine potentially active volcanic centers that are Pleistocene or younger in age, and had phreatic eruptions in the Valley of Desolation in 1880 and 1997. The rugged landscape of Dominica has also been shaped by its tropical climate and landslides, caused by storms like Tropical Storm Erika in 2015. Today, Dominica is known as the Nature Island of the Caribbean. There are numerous eco-tourism sites and the Waitukubuli National Trail, an island-wide 185 km hiking trail, was recently completed. The tourism sites feature active geothermal areas, with fumeroles and steam vents, as well as older lava flows and explosive deposits of pumice and ash. Recent shallow seismic swarms in northern and southern Dominica may be indicative of volcanic unrest. The goals of this project are to understand how different processes have shaped the Dominican landscape and history in the past and how they may manifest in the future. Researchers hope to elucidate the complicated explosive history of the island through geochronology and petrologic studies. They will build upon prior work by characterizing meteoric and hydrothermal waters, as well as volcanic gasses, from fumeroles to contribute to baseline monitoring of volcanic activity for use in detecting volcanic unrest. The researchers will also study how the landscape has affected the settlement of people and the history of landslides.



The Dominica Keck project group at the rim of Boiling Lake, Valley of Desolation in the summer of 2017. Image courtesy of Dr. Holli Frey.

Is Larger Smarter? Investigating the Effect of Group Size on Collective Intelligence

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Christopher Chabris** (Psychology)

ABSTRACT:

From Wikipedia and Linux to scientific and business work-groups all over the world, online and off-line groups are becoming a pervasive part of modern life. It is becoming increasingly important to understand how to improve the performance of these groups. This work will use collective intelligence, a new measure of generalized group effectiveness, to help do this. While there have been decades of research on factors that affect the performance of groups, almost all these studies have each focused on a single task. This work uses the perspective of collective intelligence to investigate not just the ability of a group to perform a single task, but the group's general ability to perform a wide range of tasks. Since many real-world groups must cope with a wide range of problems, such a perspective may be needed to systematically predict their performance. By making an online test of collective intelligence available to other researchers, the project will help advance scientific practice in this area. By providing a firmer scientific foundation for measuring and improving the performance of groups, the project may help our society address many of its most important problems more effectively.

Memory Lane: A Neuro-Exergame to Mitigate Cognitive Decline Later in Life (iPACES™)

1ST PLAYABLE PRODUCTIONS
THE NATIONAL INSTITUTES OF HEALTH

PROJECT PERSONNEL:

Principal Investigator **Dr. Cay Anderson-Hanley** (Psychology)

ABSTRACT:

1st Playable Productions and Union College collaborated to develop a commercializable product combining physical exercise and cognitive activities through interactive gaming on a stationary bicycle to help prevent cognitive decline and dementia in older adults. The Interactive Physical and Cognitive Exercise System (iPACES™) developed by Union College's Healthy Aging and Neuropsychology Lab is the first system to combine physical and cognitive interventions. It has already proven to have a greater cognitive benefit to older adults than either intervention alone. While behavioral interventions are unlikely to completely prevent or halt dementia, there is the potential for synergistic physical and cognitive exercise to reduce the risk of onset dementia or slow progression. Creating an affordable and easily distributed product enables wide access to this intervention, furthering understanding of which combinations have the biggest impact. Considering multiple causes of dementia, no known cure, and minimal benefit from medication, behavioral interventions to improve brain health are a critical component for extending quality of life for patients, families, and their support systems.

ACTIVE GRANTS

Continued

Minerva Fellows Program

THE HERMAN GOLDMAN FOUNDATION

ABSTRACT:

Union's mission is to educate students to be engaged, innovative and ethical contributors to an increasingly diverse, global and technologically complex society. The Minerva Fellows Program shapes that vision by exposing recent Union graduates to the human side of poverty and by teaching them to harness their entrepreneurial skills and talents for lasting, positive impact. While many students care deeply about those who are less fortunate, they know little about the opportunities that exist to help. This program provides that opportunity to make a difference. While some Minerva Fellows may become social entrepreneurs who devote their careers to finding innovative ways to eradicate poverty or improve conditions in the developing world, many will return to a conventional career path. Regardless of the path they choose, their experience as a Minerva Fellow changes each of them forever – they become global citizens. And by sharing their experiences with students on campus, their impact is multiplied.

Our Shared Humanities

THE ANDREW W. MELLON FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Jennifer Fredricks** (Dean of Academic Department and Programs); Project Director **Dr. Stephen Romero** (Psychology & Interdisciplinary Studies); Steering Committee **Dr. Deidre Hill Butler** (Sociology), **Dr. Andrew Burkett** (English), **Dr. William Finlay** (Theater), **Frances Maloy** (Schaffer Library), **Dr. Fernando Orellana** (Visual Arts), **Dr. John Rieffel** (Computer Science), and **Denise Snyder** (Learning Technologies & Environments)

ABSTRACT:

Union's Our Shared Humanities initiative promotes the integration of the arts and humanities across academic disciplines through faculty development and a series of distinctive hands-on experiences for students and faculty. Our Shared Humanities allows the College to build on its traditional strength of crossing disciplinary boundaries to prepare students for an increasingly diverse, global and technologically complex society. This is accomplished, in part, by providing faculty with a broad range of opportunities to explore collaborations that promote the integration of the arts and humanities with other disciplines across the curriculum. These include workshops, discussion groups and participation in conferences or other travel that bring artistic and humanistic perspectives to bear across disciplinary boundaries. The grant supports workshops and initiatives related to instructional design and student-centered learning includes a series of events that educate faculty on state-of-the-art research about how students learn, the expansion of Union's Faculty Development Institutes (FDI), promotion of Union's Maker Community, and acquisition of library holdings that will expand our collections of materials that integrate the arts/humanities across the disciplines.

Phenotypic and Genomic Patterns of Divergence across a Young *Drosophila* Species Complex

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Roman Yukilevich** (Biology)

ABSTRACT:

The process of speciation (the splitting of one species into two) is the fundamental source of biodiversity and yet is still not well understood. This study will advance understanding of the genetic, behavioral, and morphological changes that allowed new species to fully differentiate from one another. The research focuses on fruit flies, which have long served as a model organism for studies of genetics. By studying closely related species of fruit flies, it is possible to tease apart which genetic changes led to the original separation versus which changes happened afterwards. The project will identify what genetic differences are associated with differences in mating behavior and morphology that restrict or even prevent interbreeding between newly diverged species. The project will involve undergraduate students, train them in DNA sequencing and genetic analysis, and findings will be used to train high school teachers and develop science educational workshops.



As part of the Our Shared Humanities initiative at Union College, Professors Nicole Theodosiou and Laini Nemett redesigned the Illustrated Organism course. Image courtesy of Dr. Nicole Theodosiou and Laini Nemett.



Professors Deidre Hill Butler and Barbara Danowski designed a new course exploring the impact of racial bias and inequality on science and healthcare-related case studies chosen throughout the 20th and 21st centuries as part of the Our Shared Humanities initiative. Image courtesy of Dr. Deidre Hill Butler and Dr. Barbara Danowski.

ACTIVE GRANTS

Continued

Provenance and Thermal Evolution of the Chugach-Prince William Terrane Flysch, Southern Alaska

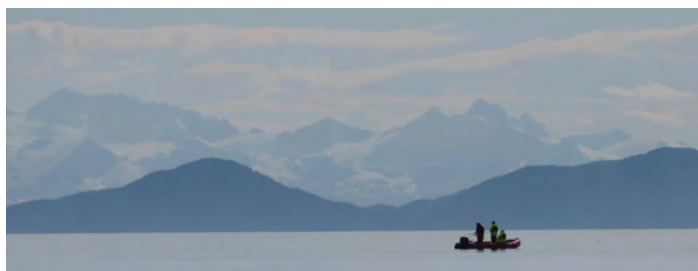
THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. John Garver** (Geology)

ABSTRACT:

The Chugach-Prince William terrane is an extensive accretionary complex that formed along the western margin of North America during subduction (under-thrusting) of oceanic lithosphere in the Cretaceous to Eocene. Researchers use geochronology, stratigraphy, petrology, structural geology, and geophysics to unravel the source region of this accretionary complex and subsequent thermal history. This research directly addresses several key problems in North American tectonics related to terrane formation, translation, accretion, and basin formation, and is helping advance geochronologic methods used for tracking the origin and thermal evolution of sedimentary rocks. This project has a strong educational component aimed at increasing the number of students in the geoscience pipeline and ultimately the workforce, and our effort is partly focused on recruiting students under-represented in the geosciences.



Race, Rights, and Disaster Relief: Hurricane Camille, Mississippi, and the Transformation of American Disaster Policy

THE NATIONAL ENDOWMENT FOR THE HUMANITIES

PROJECT PERSONNEL:

Project Director **Dr. Andrew Morris** (History)

ABSTRACT:

This prestigious NEH fellowship supports Dr. Andrew Morris' book project focused on Hurricane Camille, which devastated the Mississippi Gulf Coast in 1969, brought the inequities of disaster relief in the US into sharp focus, and ushered in an era where the federal government assumed primary responsibility for individuals impacted by major disasters across the country. The shortcomings of traditional arrangements were legion after Camille. Racial discrimination in disaster relief after Camille brought disaster relief into the national spotlight, but the impulse to turn to the federal government transcended race and political ideology. The racial and financial failures of existing institutions following Camille pushed federal policy toward establishing a national entitlement for Americans for relief from natural calamities.

Reconstructing the Biogeochemistry in Tropical Aquatic Ecosystems Using Elemental and Stable Isotope Tracers in Freshwater Bivalve Shells

THE FLEMISH SCIENCE FOUNDATION, BELGIUM

PROJECT PERSONNEL:

Principal Investigator **Dr. David Gillikin** (Geology)

ABSTRACT:

Aquatic ecosystems are vulnerable to changes in land use, climate, and nutrient inputs, as the material they transport is directly influenced by a range of catchment characteristics. This is particularly true for tropical systems which are under increasing stress and are sensitive early indicators of catchment modifications. Long-term datasets on aquatic biogeochemistry are virtually non-existent. An elegant method to circumvent this absence is to use well-dated biological archive to reconstruct environmental conditions. Freshwater bivalves have demonstrated the potential to store such information in their shell: the geochemical composition along the growth axis provides a history of aquatic biogeochemical and environmental conditions during the lifetime of the bivalve. The researchers have initiated detailed monitoring of a wide range of parameters on several African rivers at unprecedented temporal resolution. The research will provide excellent case studies of how freshwater bivalves record known (and unknown) changes in climate and/or land-use in understudied tropical catchments.

[LEFT] A quiet day on the Prince William Sound. The Keck Alaska team conducted fieldwork in the region during the summer of 2018, traveling from Anchorage to Valdez, Alaska. Image courtesy of Dr. John Garver.

Renewable and Compostable Fungus Based Plastics - Establishing the Structure/Property/Processing Relationships to Facilitate Commercialization

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Ronald Bucinell** (Mechanical Engineering)

ABSTRACT:

Renewable and biodegradable materials are a key element to a sustainable planet. Researchers from Rensselaer Polytechnic Institute, Union College, and Ecovative Design, LLC, will expand the range of applications where highly renewable, compostable, and inexpensive materials can replace petroleum-derived products. Ecovative Design has created new compostable mycelium-based (fungus) bioplastic/biocomposite materials that have the potential to be used in markets such as transportation and recreation that currently use petroleum-based plastics, but first the structure/property/processing relationships need to be understood. This grant supports fundamental research to provide needed knowledge on how to optimize and tailor the properties of these new materials.

ACTIVE GRANTS

Continued

Russian Language Teaching Assistant

THE INSTITUTE OF INTERNATIONAL EDUCATION

PROJECT PERSONNEL:

Project Director **Dr. Kristin Bidoshi** (Modern Languages & Literatures)

ABSTRACT:

The Institute of International Education (IIE) administers the U.S. Government's flagship international exchange program – the Fulbright Program. The Fulbright Foreign Language Teaching Assistant (FLTA) program provides welcome and exciting resources for Union's Russian language program. The FLTA assists in teaching first and second year language courses. In conjunction with that work, the FLTA leads practice or drill sessions, offers guided conversational activity, and provides tutoring as appropriate. The FLTA attends and actively participates in Language Table and Language Club meetings, while fully engaging in campus life by residing in residences associated with our Language Programs, offering to our students further informal practice in every-day conversational language. The FLTA is a valuable asset to Union, offering the college community an increased international presence and diversity in language programming.

Science & Technology Entry Program

THE NEW YORK STATE EDUCATION DEPARTMENT

PROJECT PERSONNEL:

Director **Angela Tatem** and Associate Director **Janet Sweeney** (The Ralph and Marjorie Kenney Community Center)

ABSTRACT:

Since 1994, Union College has been awarded the Science & Technology Entry Program (STEP) grant by the New York State Education Department to establish collaborative relationships with public schools in the City of Schenectady. The program aims to engage and excite historically underrepresented and economically disadvantaged students to consider studies and careers in mathematics, science, technology, health related fields and the licensed professions. By participating in Union College's STEP program, public school students partner with Union faculty and students to receive high-quality instruction, including academic tutoring, college-level courses for enrichment, and opportunities to work with college students and faculty on research projects.



Special Metrics in Kaehler and Sasaki Geometry

SIMONS FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Christina Tønnesen-Friedman** (Mathematics)

ABSTRACT:

The Simons Foundation Collaboration Grants for Mathematicians supports the “mathematical marketplace” by substantially increasing collaborative contacts between mathematicians. Through the grant, Dr. Tønnesen-Friedman will continue her efforts started with her first Simons Foundation Collaboration grant. She will strengthen her collaboration with Dr. Charles Boyer from the University of New Mexico, will attend conferences and meetings in Kahler geometry, Sasaki geometry, or related topics, invite potential collaborators to Union College, travel to visit potential collaborators, and sponsor participants at the Union College Mathematics Conferences throughout the grant period.

SUCCESS: Stimulating Undergraduates: Creating Contributors in Engineering & Science for Society

THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Joanne Kehlbeck** (Chemistry); co-PIs **Dr. Samuel Amanuel** (Physics & Astronomy), **Dr. Palmyra Catravas** (Electrical, Computer & Biomedical Engineering), **Dr. Rebecca Cortez** (Mechanical Engineering), and **Dr. Scott Kirkton** (Biology); Senior Personnel **Dr. George Bizer** (Psychology)

ABSTRACT:

The SUCCESS Scholars program further broadens Union's inclusive recruiting strategy by building relationships with small, rural under-resourced public high schools in order to attract and retain talented students to STEM fields. SUCCESS scholars are selected from all science and engineering disciplines, with four-year scholarship support for two cohorts of ten students. The project is helping participants achieve success by meeting the educational and financial needs unique to their situations and backgrounds. The SUCCESS Scholars program is designed to produce talented, energetic STEM professionals from diverse backgrounds and the approach will be transferable to educational institutions across the country. SUCCESS scholars trained as leaders and capable of propagating transformative mentoring skills will positively impact this nation's workforce.

[LEFT] Union College SUCCESS Scholar Thomas Gagliardi '19 delivers remarks at the Integrated Science and Engineering Complex's groundbreaking ceremony on Friday, May 19, 2017. Thomas, a biochemistry major, also held a Health Care and Life Sciences Internship at IBM. Photo courtesy of the Office of Communications.

ACTIVE GRANTS

Continued

The Arthur O. Eve Higher Education Opportunity Program

THE NEW YORK STATE EDUCATION DEPARTMENT

PROJECT PERSONNEL:

Program Director **Philip Poczik** (AOP/HEOP)

ABSTRACT:

Union College has participated in The Arthur O. Eve Higher Education Opportunity Program (HEOP) since its inception over 50 years ago. The program provides a broad range of services to New York State residents who, because of academic and economic circumstances, would otherwise be unable to attend a postsecondary educational institution. Union continues to pursue its goal of providing a viable option for higher education for the economically and educationally disadvantaged population of New York. Through the HEOP, we will continue to provide the resources required to achieve this goal by providing academic support and mentoring, while also encouraging students to pursue studies leading to careers and professions in underrepresented areas.

The Stylus and the Scalpel. A Theory and Practice of Metaphors in Seneca's Prose

LOEB CLASSICAL LIBRARY FOUNDATION

PROJECT PERSONNEL:

Fellow **Dr. Tommaso Gazzarri** (Classics)

ABSTRACT:

Dr. Gazzarri's fellowship award will support his book project, which provides a functional description of Seneca's dialectical relation between metaphorical language and philosophy: namely, it shows how Stoic philosophy finds a new means of expression in Seneca's highly elaborated rhetorical discourse, and how this relates to the social and cultural demands of Neronian culture. This project expounds Seneca's text based on the assumption that metaphors are purposely utilized to work "collectively" rather than by category or type and that, therefore, the analysis of what metaphors do when Seneca chooses to combine them in clusters, demonstrates the existence of a "metanarrative of rhetoric". This approach is fundamentally innovative and has the advantage of gauging the functioning of Senecan style (or at least a crucial part thereof) as a whole, rather than focusing on single features of its rhetorical functioning. The book addresses the relation between Stoic materialism and bodily imagery to show how philosophical preaching materially contributes to the healing of human soul because it shapes the individual's cognitive faculty in a way that is physical and not simply figurative. The stylus and the scalpel blend in their functions.

[RIGHT] Max Libre '19 and Aiyana Poulin '19 traveled with Professor Rebecca Koopmann to Kitt Peak National Observatory near Tucson, Arizona to observe at the WIYN 0.9m telescope. They targeted galaxies in intermediate density groups to measure their star formation and explore how the environment of a group could be affecting the evolution of member galaxies. Image courtesy of Dr. Rebecca Koopmann.

The Undergraduate ALFALFA Team

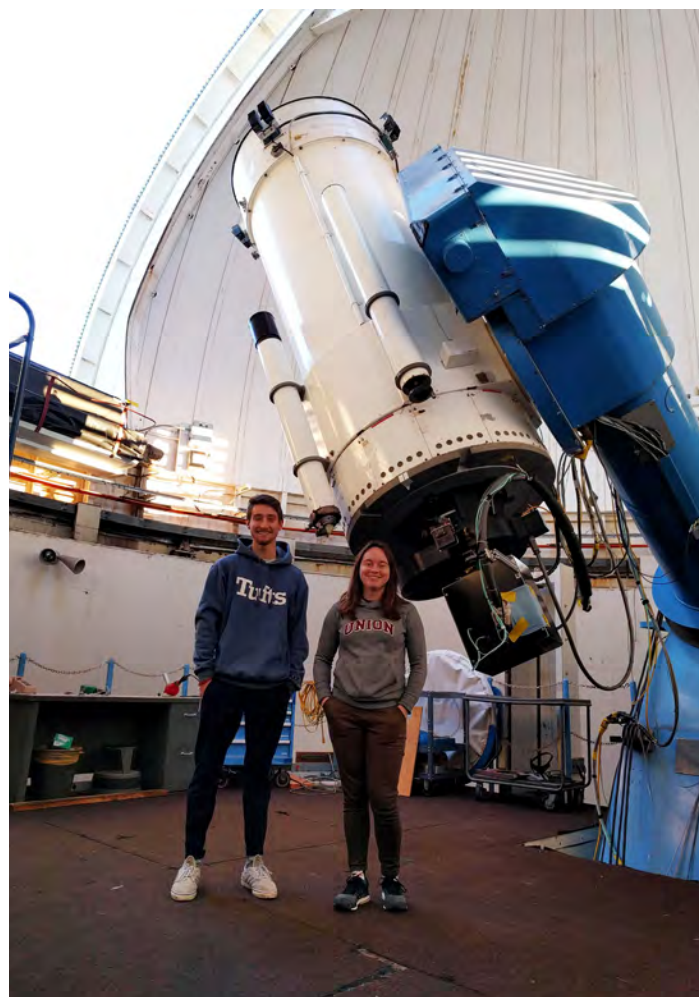
THE NATIONAL SCIENCE FOUNDATION

PROJECT PERSONNEL:

Principal Investigator **Dr. Rebecca Koopmann** (Physics & Astronomy)

ABSTRACT:

The Undergraduate ALFALFA Team (UAT), a consortium of 23 undergraduate-focused institutions from across the United States, is conducting a multi-faceted program of student training, faculty development, and public outreach that is integrated into the Arecibo Legacy Fast ALFA (where ALFA refers to the Arecibo L-band Feed Array detector) collaboration. UAT students and faculty participate through several program components, including workshops and observing sessions, group work, and undergraduate research experiences. The collaborative nature of the program, supported by appropriate computer infrastructure and communication media, enables students and faculty to participate effectively in data analysis and remote observing. The program builds connections between staff at Arecibo Observatory and faculty and students at the participating US institutions. The project develops publicly available materials that enhance the undergraduate astronomy curriculum for both science and non-science majors.



ACTIVE GRANTS

Continued

Undergraduate Summer Research Fellow

GLOBALFOUNDRIES

PROJECT PERSONNEL:

Undergraduate Research Director **Dr. Chad Orzel** (Physics & Astronomy)

ABSTRACT:

Undergraduate research is an integral part of Union's curriculum and is key to cultivating and retaining student interest in STEM fields. Through a competitive selection process, the GLOBALFOUNDRIES Undergraduate Summer Research Fellow will conduct original research for eight weeks during the summer with a faculty member. The Summer Research Fellow will have the opportunity to present their work to the Senior Vice President and General Manager for GLOBALFOUNDRIES US Fab Operations and a team of GLOBALFOUNDRIES researchers who will ask stimulating questions and provide feedback to the student researcher. Undergraduate research provides opportunities for students to develop a critical understanding of their field through learning the current state of knowledge, gain experience and confidence in knowing when and how to ask the right questions to solve difficult problems, and students often have the satisfying experience of coauthoring publications and delivering papers at conferences. Over the years, Union has sent more than 700 students to National Conference on Undergraduate Research (NCUR), among the largest delegation of undergraduates to this conference. Our students present their work at annual meetings of professional societies including The American Chemical Society, ASME International Mechanical Engineering Congress & Exposition, American Physical Society, and the Materials Research Society.

Union College Concert Series

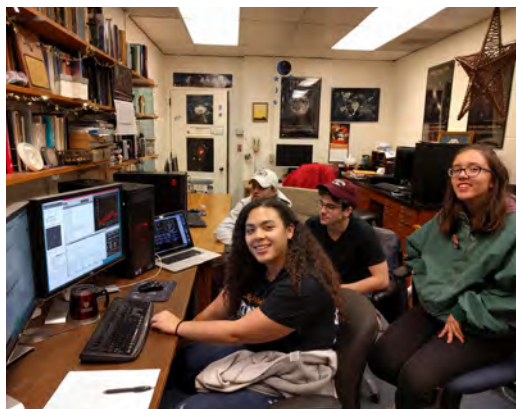
THE NEW YORK STATE COUNCIL ON THE ARTS

PROJECT PERSONNEL:

Artistic Director **Derek Delaney** (Union College Concert Series)

ABSTRACT:

The Union College Concert Series (UCCS) was founded in 1956 by faculty member Edgar Curtis to bring regional and renowned recitalist and chamber ensembles to Schenectady. In 1969, music enthusiast and local pathologist Dr. Daniel Berkenblit joined the committee as its artistic chair and assumed leadership in 1979. Under Dr. Berkenblit's guidance, UCCS expanded and developed into one of the most respected classic music series in the Northeast. In 2012, Derek Delaney assumed leadership of the volunteer organization and in 2014 came on full-time to strengthen community ties to the series. Since then, concert attendance has increased and the series now presents 14-17 concerts each season and has added free concerts for the community, outreach programming at assisted living facilities, free pre-concert lectures, and masterclasses. Many talented musicians are featured each year, including legendary pianist Mitsuko Uchida, pianist Jonathan Bliss, with eminent British tenor Mark Padmore, and extremely talented young artists in collaboration with the Curtis Institute of Music in Philadelphia.



Gianna Morton '21 on a remote observing session at Arecibo from Professor Rebecca Koopmann's lab. Image courtesy of Dr. Rebecca Koopmann.

Union College Space Grant

NASA – NEW YORK SPACE GRANT

PROJECT PERSONNEL:

Principal Investigator **Dr. Rebecca Koopmann** (Physics & Astronomy)

ABSTRACT:

Union College has been a member of the NASA – New York Space Grant since 2007. In the past eight years, 57 summer research projects, student travel to conferences, and a student outreach team were sponsored through funding. The research objectives for students who participate in the summer research program are threefold: 1) to participate in a STEM research project; 2) to engage in the summer seminar program at Union College; and 3) to present their findings at a local, regional or national conference. Space Grant funds are primarily dedicated to student research support, allowing the maximum number of participants each summer. On-campus presentations and summer seminars provide a natural forum for these projects, as well as help students gain exposure to the variety of other science and engineering projects on campus. Space Grant awardees will participate in Union's active summer student seminar program, which features talks or posters by each student researcher. They will also present their findings at campus research seminars and will be strongly encouraged to present their results at regional or national meetings. Related outreach activities will include partnering with Union College's Kenney Community Center, to reach out to the local secondary schools to host the Union College Physical Constants Workshop for high school physics teachers and students, which has had a total student attendance of 127 over the past 8 years. Teachers and students from regional high schools work in teams with Union College Physics and Astronomy faculty and advanced undergraduates to perform experiments, gaining experience with modern instrumentation and laboratory techniques such as high-resolution video analysis, scattering experiments with a particle accelerator and scanning electron microscopy.

W. Howard Wright Scholars

THE WRIGHT FAMILY FOUNDATION

ABSTRACT:

The W. Howard Wright Scholarship supports four outstanding, full-time undergraduate students majoring in Mechanical Engineering.

SUBMITTED PROPOSALS

Acquisition of a High Resolution High Speed 3D Motion Tracking System for Multi-Disciplinary Research and Research Training

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. John Rieffel** (Computer Science); Co-PIs **Dr. Dr. Jennifer Currey** (Electrical, Computer & Biomedical Engineering), **Dr. Leo Fleishman** (Biology), **Dr. Scott Kirkton** (Biology), and **Dr. Nick Webb** (Computer Science); Senior Personnel **Dr. Luke Dosiek** (Electrical, Computer, & Biomedical Engineering) and **Dr. William Keat** (Mechanical Engineering)

Acquisition of a Powder X-Ray Diffractometer (PXRD) for Interdisciplinary Research and Research Training

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Michael Hagerman** (Chemistry); Co-PIs **Dr. Samuel Amanuel** (Physics & Astronomy), **Dr. Ann Anderson** (Mechanical Engineering), **Dr. Joanne Kehlbeck** (Chemistry), and **Dr. Heather Watson** (Physics & Astronomy); Senior Personnel **Dr. Mary Carroll** (Chemistry), **Dr. Rebecca Cortez** (Mechanical Engineering), **Dr. Kurt Hollocher** (Geology), and **Dr. Matthew Manon** (Geology)

Advancing Cognitive Neuroscience Research at Union College through the Development of an EEG/ERP Core

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Stephen Romero** (Psychology and Director of Interdisciplinary Studies); Co-PI **Dr. Chad Rogers** (Psychology); Senior Personnel **Dr. Alyssa Morey** (Psychology/University at Albany), **Dr. D. Catherine Walker** (Psychology), and **Dr. Erika Wells** (Boston University)

Automated Design and Distributed Control of Low-Cost Modular, Self-Assembling Tensegrity Robots

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. John Rieffel** (Computer Science); Co-PIs **Dr. Luke Dosiek** (Electrical, Computer & Biomedical Engineering) and **Dr. Scott Kirkton** (Biology); Senior Personnel **Dr. Jennifer Currey** (Electrical, Computer & Biomedical Engineering), **Dr. Ellen Gasparovic** (Mathematics), **Dr. Brenda Johnson** (Mathematics), and **Dr. William Keat** (Mechanical Engineering)

Beyond Mammies and Matriarchs: Visibility of Black Stepmothers

THE NATIONAL ENDOWMENT FOR THE HUMANITIES

Project Director **Dr. Deidre Hill Butler** (Sociology)

Can Cascade Reinforcement Initiate and Complete Speciation? Theoretical and Empirical Investigations in Killfish

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Roman Yukilevich** (Biology)

Citizenship as Struggle – Examining Rights-Based Activism in Rural India

AMERICAN COUNCIL OF LEARNED SOCIETIES

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Jeffrey Witsoe** (Anthropology)

CUR Campus-Wide Award for Undergraduate Research Accomplishments

COUNCIL ON UNDERGRADUATE RESEARCH

Emotion and Imagination in Plato and Aristotle

THE NATIONAL ENDOWMENT FOR THE HUMANITIES

Project Director **Dr. Krisanna Scheiter** (Philosophy)

Enhancing Entrepreneurship and Advancing Commercialization Opportunities through an Interdisciplinary Capstone Experience

VENTUREWELL

Principal Investigator **Dr. Jennifer Currey** (Electrical, Computer & Biomedical Engineering); Co-PIs **Dr. Shane Cotter** (Electrical, Computer & Biomedical Engineering) and **Dr. Sudhir Khetan** (Electrical, Computer & Biomedical Engineering)

Environmental Fate and Protein Binding of Poly- and Perfluorinated Compounds

THE CAMILLE & HENRY DREYFUS FOUNDATION, INC.

Principal Investigator **Dr. Laura MacManus-Spencer** (Chemistry)

Extractivism, Policing, Resilience: Struggling for Inclusion, Rights and the Environment

THE ROCKEFELLER FOUNDATION

Project Director **Dr. Guillermina Seri** (Political Science)

SUBMITTED PROPOSALS

Continued

Geomorphic and Drainage Basin Controls on ENSO records Preserved in Lakes in Las Cajas National Park, Ecuador

NATIONAL GEOGRAPHIC SOCIETY

Principal Investigator **Dr. Donald Rodbell** (Geology)

How Extraordinary Partnerships in the Arts & Humanities are Transforming America

AMERICAN COUNCIL OF LEARNED SOCIETIES

Project Director **Dr. Christine Henseler** (Modern Languages & Literatures)

The Integrated Science & Engineering Complex (ISEC)

FRED L. EMERSON FOUNDATION

Jean Dreyfus Lectureship at Union College

THE CAMILLE & HENRY DREYFUS FOUNDATION, INC.

Project Directors **Dr. Mary Carroll** (Chemistry), **Dr. Michael Hagerman** (Chemistry), and **Dr. Joanne Kehlbeck** (Chemistry)

Lefschetz Properties and Jordan Type in Algebra, Geometry and Combinatorics, Levico, 2018

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Leila Khetami** (Mathematics)

Memory Lane: A Neuro-Exergame to Mitigate Cognitive Decline in Later Life

NATIONAL INSTITUTES OF HEALTH

Principal Investigator **Dr. Cay Anderson-Hanley** (Psychology)

Modeling Human Neurulation by Engineered Organogenesis

NATIONAL INSTITUTES OF HEALTH

Principal Investigator **Dr. Ashok Ramasubramanian** (Mechanical Engineering)

Next Generation Stability Monitoring for the Power Grid of the Future

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Luke Dosiek** (Electrical, Computer & Biomedical Engineering)

Renovation Project for the New Union College Office of Campus Safety

THE WRIGHT FAMILY FOUNDATION

Science, Medicine, Technology and National Socialism

DUETSCHES MUSEUM

Project Director **Dr. Mark Walker** (History)

SCIP, HOP & JUMP: Summer Clinical Immersion Program, Hands on Prototyping, and Jump-starting Design Projects towards Translation

NATIONAL INSTITUTES OF HEALTH

Project Director **Dr. Jennifer Currey** (Electrical, Computer & Biomedical Engineering); Program Faculty **Dr. Shane Cotter** (Electrical, Computer & Biomedical Engineering) and **Dr. Sudhir Khetan** (Electrical, Computer & Biomedical Engineering)

Second Workshop for Women in Computational Topology (WinCompTop 2)

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Ellen Gasparovic** (Mathematics)

Social Cues for Human-Robot Interaction in the Wild

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Nick Webb** (Computer Science)

The Use of Extended Immersive Reality to Train Russian Verbs of Motion

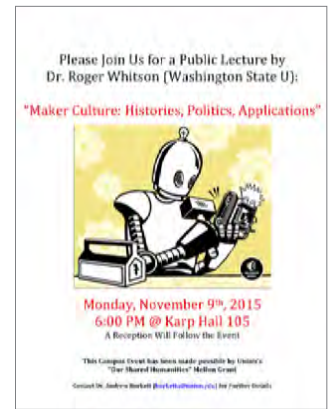
U.S. DEPARTMENT OF EDUCATION

Project Director **Dr. Kristin Bidoshi** (Modern Languages & Literatures)

Total Mass and Quasi-Local Mass in General Relativity

THE NATIONAL SCIENCE FOUNDATION

Principal Investigator **Dr. Jeffrey Jauregui** (Mathematics)



PROPOSALS AND AWARDS

A Year in Review

21 NEW AWARDS

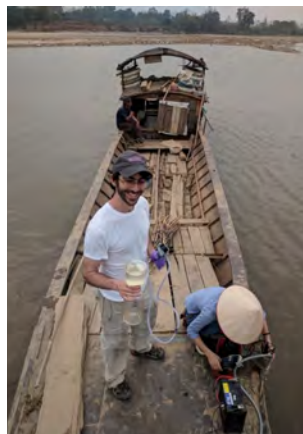
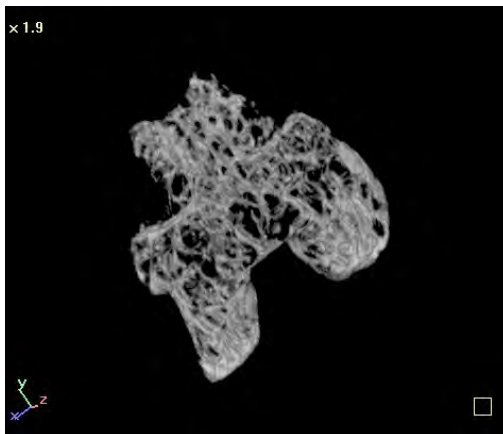
Involving 39 Union College Faculty & Staff
From 17 Academic Departments and Programs
Totaling \$2,675,887

47 PROPOSALS SUBMITTED

Involving 49 Union College Faculty & Staff
From 18 Academic Departments and Programs
Totaling \$6,627,059

65 ACTIVE GRANTS

Involving 70 Union College Faculty & Staff
From 27 Academic Departments and Programs
Totaling \$10,575,051



COLLEGE RELATIONS
OFFICE OF EXTERNAL RELATIONS
& COLLEGE GRANTS

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At the corner of Lenox Road and Union Avenue

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Website

muse.union.edu/grants/

[TOP LEFT] Professor Ann Anderson and Elizabeth Donlon '18 visiting Katcon as part of their I-Corps grant. Image courtesy of the I-Corps Aerogel Team. [TOP CENTER] Proposed cave sites in Portugal - Loft area in Buraca Gloriosa (BG) (left) and Companheira (CA) (right) in the Algarve region (southern Portugal). Images courtesy of Dr. David Gillikin [TOP RIGHT] As part of the Our Shared Humanities initiative at Union College, Professor Andrew Burkett brought Dr. Roger Whitson (Washington State University) to Union for a series of lectures and workshops that supported Prof. Burkett's "Romantic Revolution" course. Image courtesy of Dr. Andrew Burkett. [BOTTOM LEFT] Image of the subchondral bone of a mouse femoral condyle (knee) with the growth plate removed for analysis. The growth plate does not close in mice like in humans. Because of this, it must be removed from analysis in order to accurately measure any changes in the trabecular number and thickness which is associated with post-traumatic osteoarthritis. Image courtesy of Dr. Jennifer Currey [BOTTOM CENTER] Professor Mason Stahl (left) testing some of the sampling procedures to be used on the Mohawk And Hudson Rivers during a trip to Vietnam with a colleague from Hanoi University of Science (right). Image courtesy of Dr. Mason Stahl. [BOTTOM RIGHT] First day on the water in the Prince William Sound for Cameron Davidson (Carleton College), Caitlin Noseworthy (St. Norbert College), Victor Garcia Jr. (University of Texas - Austin), and Nicholas Gross Almonte (Carleton College). Part of the Keck Geology Consortium project in Alaska. Image courtesy of Dr. John Garver.

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