CHEMICAL ENGINEERING IN THE CONGO: STORY OF SUCCESS

In This Issue:

Cover story: Pg. 4
Adventures in coffee-tasting: Pg. 6
Jim Lee discovers new gene therapy: Pg. 10
Letter From The Chair

Dear Alumni and Friends,

I hope you have been keeping well. Since we last connected, we have experienced unexpected and unprecedented events that have challenged us like never before. Things are far from easy, and my heartfelt empathy goes out to all who may be experiencing strife.

Yet, within these challenging times, there can be hope for better days. We can embrace the sentiment that misfortunes can make us wiser, and emerge better for it. We can also pause to count our blessings and remember that good things are still happening all around us.

Amidst the changes we are experiencing, some things, like working towards increased racial justice, are very positive (although long overdue). Your CBE Department continues to uphold the Buckeye values of promoting equality, inclusiveness, and appreciation for diversity, but more needs to be done. I am pleased to let you know that after an open meeting with students, the Racial Equity Task Force was formed to further our collective goals.

As engineers, we are blessed with unique gifts that can be leveraged to address all kinds of challenges. On this and other fronts, our expertise, ingenuity, and persistence can prevail, and I believe much good can result.

I am especially glad to be able to share with you just such a story of how our engineers are solving problems. The story involves several alumni who worked to help bring an end to the Ebola outbreak in the Democratic Republic of the Congo. I hope you will find comfort and pride in knowing what an impact your fellow alumni can have on the world. It's highly possible that right now, alumni are working on ways to end Covid-19—and we will be able to say that our alumni helped to end this pandemic, as well. Wouldn't that be wonderful?

On a lighter note, I was intrigued by alumnus Scott Westfall's career as an engineer and coffee tester. Perhaps you'll be able to take respite in this mini-odyssey of a story—ideally with a cup of coffee—and delight in it yourself.

We also have exciting news about alumni, with one recent grad being named to the Forbes’ "30 Under 30" list.

ALUMNI!
TELL US YOUR NEWS

We love hearing from you, and your classmates would love to hear from you as well.

Share a favorite memory; let us know about your career or business success; or just drop us a line and tell us how you are doing.

Email: williamson.48@osu.edu

Cover photo: A group of physicians, clinicians, and engineers who worked to develop and enact point-to-point systems to safely transport and store Ebola drug products in the Democratic Republic of the Congo. Rachel Sawyer (’19) on far right, Dan Littlefield (’86, ’88) second from far right.

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KOFFOLT NEWS

Feature Stories
Alumni: 4-7
Faculty: 10-12
Students: 14-15

KOFFOLT NEWS

Alumni: 8-9
Faculty: 12-13
Students: 14-15

Chemical Engineering in the Congo
Story of Success

Philanthropy
Donor Lists by Class Year: 16-17
Triplets Catalyze Success: 18
Support Your CBE: 19
Where can chemical engineering take you? How about the jungles of the Democratic Republic of the Congo (DRC), helping to fight Ebola?

Last year in March and again in October, three Ohio State chemical engineers ventured into this war-torn, enigmatic region on a dangerous mission. The area is not only the site of an Ebola outbreak that began in August 2018—it is also an active conflict zone where violence and the aftermaths of disease and starvation have displaced or taken the lives of nearly 5 million people since 2008.

One year after Ebola first broke out in the DRC, public health organizations announced that they had found an effective treatment for the devastating illness, which causes massive hemorrhaging and had been resulting in the deaths of up to 70 percent of patients infected.

Delivering a solution

Researchers had found two antibiotics, mAb14 and REGa-EB3, shaped immune proteins that recognize and bind to the Ebola virus, effectively stopping it in its tracks. Used together within a day of infection, this dual treatment led to survival rates of around 90 percent. Better yet, a vaccine was having 90 percent success. Finding an effective treatment might have been the end of the problem, but it was not going to be so simple.

The challenge was to successfully transport these potentially life-saving investigational drug products (IDPs) in the high risk and harsh environment of the eastern provinces of the DRC. Both the WHO and US NIH called upon the expertise of Ohio State chemical engineers to ensure that these priceless IDPs arrived at the patient with the same safety and efficacy as when they left their site of manufacture. Enter the chemical engineers at Modality Solutions. Founded by Daniel Littlefield, BSE’86, MS’87, Modality Solutions specializes in“cold chain” processes to manage point-to-point transport conditions ensuring that a company’s drugs reach patients intact and viable. This involves navigating every step of the transport environment, from factory to final storage destination.

The process starts with analyzing the conditions that might be encountered on each transit system to be used. The company then tests specific pharmaceutical packaging and simulates the transport environment to assess how packages and product fare when they undergo temperature variations, sudden movement, and vibrations such as might occur in a cargo hold or shipping container.

This WHO and US NIH contracted with Modality Solutions to have Littlefield and employees Rob Battista (16) and Rachel Sawyer (19) work on site to train healthcare providers on how to receive, transport, and store the drugs, which required different temperature ranges and handling procedures. This involved packing the drugs in the appropriate thermal packaging, checking temperature en route, and testing freezer functionality and drug viability at the final destination.

Although they never came into direct contact with Ebola patients, the work was still nerve-wracking. They traveled mostly by helicopter because of unsafe or poor-quality roads. On the ground, they saw ominous signs with the words “Danger,” “Keep Out,” and “Never touch the dead bodies of humans.”

Multiphasic challenges

As many expat workers know, helping people in a foreign country can be harder than expected. Tensions were heightened by the fact that a rampant disinformation campaign led by extremist rebel militias was leading to attacks on clinics and healthcare workers, particularly expatriates. The rebel groups wanted outsiders to leave in order to better control their territories. They would spread rumors that Ebola “wasn’t real” or that health workers were spreading the disease to turn a profit by harvesting body parts.

In 2019, 85 health workers were wounded or killed in attacks on clinics. Doctors working in war zones are often killed by their own geographic isolation and limited access to medicine and supplies. A single cut or scratch can spread the virus.

The way out / The way forward

Two things finally happened to curtail the virus. The government began mass vaccinations of healthcare workers in the regions and along the borders where Ebola was being discovered. Health workers such as those in Goma undertook a strenuous campaign to educate the population and reassure fearful residents that there were now proven treatment and prevention options.

They convinced more than a thousand residents to take the vaccine. People saw the results, became more trusting, and took their treatments. The outbreak was currently considered controlled.

“Our work in the DRC against Ebola is a bit of an outlier, but it nicely illustrates how solid chemical engineering skills can apply to directly improve clinical outcomes and save thousands of lives,” Littlefield said. “I told Ohio State chemistry because I know the quality I’m getting, and I’m glad I did. It was a peak experience,” he added.

“I never expected to set foot in a place like that, but now that I have, I would jump at the chance to go again,” Battista said. “I really enjoyed the challenge, and the work was incredibly needed. As an engineer, you don’t always get to put a face to the work you do, and that was extremely fulfilling.”

Part of that fulfillment was due to the gratitude people expressed. “Everyone was so happy to see Dan, everywhere we went,” Sawyer said.

Sawyer and Battista said that the experience broadened their perspectives and made them appreciate resources taken for granted. “There’s no shortage of local expertise in the DRC—the problem is a lack of resources like good roads, transportation, and reliable electrical systems and equipment,” Battista said.

In addition to the project in the DRC, Modality Solutions has performed projects in countries such as South Africa, the Philippines, Ukraine, Tanzania, Kenya, and Kenya, among others.

Rob Battista (16) on an MH 60 helicopter operated by UNHAS traveling from Goma to Beni in the DRC

Many people believed the rumors as a result of previous negative experiences with outsiders or because they had developed a deep-seated distrust of the government during the country’s long-term military conflicts.

“A young engineer can have immediate success and impact.”

— Dan Littlefield, Founder, Modality Solutions
Adventures in Coffee Tasting

Scott Westfall is interested in chemical engineering with a question: “Why would THAT work?” As a Nestle R&D summer intern, he couldn’t get the heat exchanger to make hot water.

“Turn the flow up,” the supervisor answered.

Westfall found this counter intuitive and asked why. “Turbulence increases heat transfer,” his boss said simply and walked away. It was ChemE 101, but it intrigued him. Following his BS degree in biochemistry, in 1984 he got an MS degree in chemical engineering before resuming work at Nestle.

His Nestle career focused on instant coffee, from serving as a “taster” to developing products and designing more efficient equipment, processes, and operations. He developed a novel aroma recovery process and an encapsulation process and designed an innovative calorimeter and a scraped-surface heat exchanger. His job took him to Mexico, Malaysia, India, Thailand, the Philippines, and Switzerland. As principal engineer, he led a team of six engineers and managed a capital budget $150M before retiring in 2013.

Birth of a habit

The story Westfall tells today about his work with coffee is a fascinating one, but it started long ago. Legend has it that coffee drinking started in Ethiopia when a shepherd saw his goats become lively after eating coffee berries. Green coffee doesn’t taste very good, so when people began frying it, it made all the difference. “Something magical happened during the roasting process,” Westfall said. “It’s like a little reactor inside the bean.”

There are two types of coffee: Arabica and Robusta. Arabica, named after the Arabian peninsula from which it was introduced to the world, is now grown in Columbia, Central America, and East Africa. Robusta originated in central Africa but is chiefly now grown in SE Asia. It’s a bigger bean, has twice the caffeine of Arabica, is less expensive and more disease resistant, and has a stronger flavor some people describe as “rubbery.”

Both coffees share that all important ingredient: caffeine. By the 15th century, coffee was being consumed as a beverage, quickly becoming habit-forming among its users and gradually spreading worldwide.

A matter of taste

People aren’t born liking coffee. It’s an acquired taste resulting from acculturation. In some countries, the beans are roasted in butter due to a lack of roasters, but the butter is often anacrid—an unpleasant taste to most Westerners.

In countries that only have access to lower-quality coffees, people come to prefer a certain note that, to an American, tastes like stale, overheated coffee.

These regional taste differences made overseas work challenging. To learn about regional coffee preferences and the associated terminology, Westfall and his team visited local coffee shops and participated in focus groups or in-home tastings, where they also observed preparation.

Determining the “taste” of coffee is not easy. There is no chemical model for coffee, one can only match some of the chemistry. Researchers have been able to determine that the bitter taste of coffee is one-third lactones and dibenzalacetone, another one-third caffeine, but the other third remains unknown.

To complicate matters, unlike coffee, taste and smell are separate, and smell is still an area of science that affects one another. When two tastes combine, a third taste is produced, and aroma also affects taste, as illustrated by differing scents when tasting users wear nose plugs. Aroma itself is complex, with 1600 compounds in coffee aroma. Which ones are responsible for the actual aroma? About 70 of them, it turns out.

When the “ideal” taste has been identified, the R&D team uses the coffee to perform a principal component analysis, identifying discriminating sensory attributes. The next challenge is to get those attributes into the product in the right ratios in order to bring out the characteristics important for that market.

“Producing a ‘good’ instant coffee is a matter of trade-offs,” Westfall said. “The product has to be cost efficient while having the desired taste, aroma, freshness, and ease of preparation.”

To supplement the Philippines market, the team was charged with producing Philippine-style coffee within the Thai market using only locally sourced coffee due to import restrictions.

In Mexico where demand for Nestle’s product outstripped the local supply of coffee, it was a challenge to get enough coffee beans, again due to import limits. Nestle imported all the coffee they could, but had to supplement this with local lower-quality beans. From this, Westfall’s team had to create a product that would match consumer expectations.

The R&D team did not just work on taste attributes, but caffeine levels. When the Thai government banned amphetamines, truck drivers wanted something else to keep them awake on the road. Nestle filled the gap with “Sila” (“sleeping pill”), a robusta-based coffee cranked up through a flavor recovery process. Thai truck drivers loved it, but Americans would have found it too hard to stomach.

Nestle also developed caffeine-free coffee. One variety was not pursued because it included GMOs—

not popular with the public. Also, since coffee is a natural pesticide, a caffeine-free variety would have needed the addition of pesticides to grow it.

A cup of trouble

The production of instant coffee has its share of equipment troubles. Several times, Westfall was rushed to the site of an “equipment failure,” only to find operator error.

After having spent $10,000 on a plane ticket to the site of one such emergency, he found that the factory had recently installed a sample recycle port. The operators were leaving the valve to this port open at all times. The problem was that when draining the weigh bowl, the coffee went everywhere, creating mouthfuls of foam spilling from the tanks that plant operators then had to walk through.

Standing one’s ground

Engineers are trained to determine best outcomes, but that can get tricky when discovering an improvement that contradicts traditional wisdom, especially when one’s company has just invested $100 million in doing things the old way.

“I discovered that Method A was actually the worst way, and that we should be doing Method B,” Westfall said, recalling one such incident. “I nearly lost my job over it.”

“Sometimes I have to make bad decisions,” Westfall explained when asked why he kept speaking up, despite the risk. “If you don’t challenge what appears to you as a bad decision, then you are complicit in the failure.”

In this case, Westfall won his bosses over by providing evidence that his way of handling materials was both cheaper and easier, and it was implemented in 40 factories. Later, Westfall told his team, “If your boss is wrong, say so and put forth a strong case. If your boss objects, say so again. But if your boss still objects, then the boss is right, and it’s time to write a resume.”

A tasting session described

Tasters underwent initial and ongoing training. A typical tasting session each taster sits in an isolated booth. The lighting is controlled to a deep red so that any visual differences in the cup aren’t apparent. The taster is provided with a hot pot and preweighed coffee samples in white porcelain cups. The taster pours the water amount of water into a graduated cylinder and then pours this into the cup. The taster sniffs the cup and rates various aroma qualities using software with virtual “sliders” to select a value between 0 and 10 for each attribute.

The tasting begins. The tasters, using a standard tasting spoon, slurp the coffee. This is a very noisy slurp designed to pull aroma and flavor into the retronasal passages. The taster then spits the coffee into a “dentist bowl” and scores the sample.

Talking is prohibited. But being human, when tasting something like one of the generic, low-cost overseas products, you might definitely hear something like, “Oh my God!” at which point the sensory expert would remind the tasters not to talk.

After some tasting sessions, the tasters would gather and the composite score was revealed. Tasters were then given their individual scores. If a taster disagreed with the panel, they could discuss why. The group tried to achieve uniformity, but too much agreement could lead to overly conservative scoring. If everyone on the panel gives the medium score of 5 for each attribute, you have absolutely no sample differentiation. At times there were competitions among the panelists as a means of honing their skills and determining the better tasters. Just like James Bond can identify Château Lafite Rothschild Cabernet Sauvignon with a sip, the tasters were to identify coffee based on type and origin.

Skilled tasters earn the title of “Master Taster” and are renowned for their ability to identify subtle taste differences, even when the evidence suggests otherwise. Westfall recalled a master taster named José Jimenez who was once offered scotch from Chile’s best bottler, which is said to taste like Masterscotch. The host then confessed that it was, in fact, Masterscotch in the bottle—it was Chivas, as one would assume.
A

Kunal Parikh | Forbes Magazine

"30 Under 30 in Healthcare"

A

lumnus Kunal Parikh (12 BS) was named to Forbes magazine’s “2020 30 Under 30 - Healthcare” list. Honorees join a list of 3,000 other innovators and entrepreneurs working to make our world a better place. “These young innovators are getting personal to fix healthcare’s most pressing problems,” Forbes wrote in releasing the news. Parikh leads a team at Johns Hopkins aimed at finding and commercializing biomedical solutions for unmet medical needs. He has spent years developing drug-delivery platforms and technologies that improve patient treatment. This includes creating technology capable of sustained drug release to specific parts of the body and a platform for effective and safe gene delivery that could be used to treat or prevent infectious diseases.

An entrepreneur as well as a researcher, Parikh founded his first company, Core Quantum Technologies, while working as an undergraduate in the lab of Professor Jessica Winter at The Ohio State University’s William G. Lowrie Department of Chemical and Biomolecular Engineering.

Core Quantum Technologies: “quantum dots.”

He recently created another company, Eyedea Medical, which aims to improve access for corneal transplants.

The son of Indian immigrants, he says that he grew up with a "scarcity mentality" and learned to make the most of what was available to him.

Prior to graduating from Ohio State, he considered becoming a Jain monk, spending time in monasteries in India speaking with monks about his future. “They were very clear that my purpose should be to serve others above all else,” he said.

This led Parikh to explore different fields where he could make a difference, including biomedical engineering, biotechnology, public policy, and both nonprofit and for-profit organizations. He saw the potential for aligning the priorities of these fields in order to streamline research and patient care.

Parikh feels it is a moral imperative to bring an entrepreneurial eye to the medical field to ensure that the developments proceed through the manufacturing and regulatory processes to ultimately make things better for the patient.

“Although it’s true that the needs of society and patients are changing, it’s also true that the needs of society and patients are changing. I hope that my approach of needs identification, platform technology development, and translation [to the marketplace] can serve as a template for others who are interested in developing impactful biomedical technologies,” he said.

In 2015 he was presented with a Roche/ARCS Scholar Award at the National Academy of Sciences for the second year in a row. In addition, he was one of 36 scholars chosen to attend the Roche Pharma Research and Early Development Symposium. “It’s truly empowering to know that I have an entire group of people rooting for me and depending on me to push these discoveries towards clinical impact,” he said upon receiving the honor.

“Many thanks to Ohio State, Ohio State Engineering, and Ohio State Chemical Engineering. You were such a critical part of my journey and growth,” Parikh said.

“Technology + entrepreneurship + compassion is the formula for transformative, long-term impact.”

— Kunal Parikh, 12
L. James Lee discovers new gene therapy strategy...courtesy of Mother Nature

This new method relies on a nanotechnology-based chip to deliver biological cargo that can reprogram cells. In a fraction of a second, the device injects genetic code into the skin, converting adult cells into any cell type of interest for treatment within a patient’s own body. The technology could be used to repair injured or compromised organs to save the lives of soldiers or people who have suffered strokes or accidents.

A key advantage

For Lee, founder of Ohio State’s Center for Affordable Nanoengineering of Polymeric Biomaterials, producing the gene is the easy part. The synthetic DNA force-fed to donor cells is copied into a new molecule consisting of messenger RNA, which contains the instructions needed to produce a specific protein. Each exosome bubble containing messenger RNA is transformed into a nanoparticle ready for transport, with no blood-brain barrier to worry about.

“One advantage of this is there is no toxicity, nothing to provoke an immune response,” said Lee, also a member of Ohio State’s Comprehensive Cancer Center. “Exosomes go almost everywhere in the body, including passing the blood-brain barrier. Most drugs can’t go to the brain.

“We don’t want the exosomes to go to the wrong place. They’re programmed not only to kill cancer cells, but to know where to go to find the cancer cells. You don’t want to kill the good guys.”

The testing in mice showed the labeled exosomes were far more likely to travel to the brain tumors and slow their growth compared to substances used as controls.

Because of exosomes’ safe access to the brain, Lee said, this drug-delivery system has promise for future applications in neurological diseases such as Alzheimer’s and Parkinson’s disease.

Lee said that the method could hopefully be used for medical needs one day, creating unique treatment options for healthcare practitioners.

“If someone knows what kind of gene combination can cure a certain disease but they need a therapy, here it is.”

— Professor Emeritus L. James Lee

This work was supported by the National Science Foundation; the National Natural Science Foundation of China; the National Heart, Lung, and Blood Institute; the National Institute of Neurological Disorders and Stroke; the Cancer Prevention and Research Institute of Texas; the American Brain Tumor Association; and the National Cancer Institute. Ohio State co-authors Junfeng Shi, Jingxue Sun, Xiamin Wang, Yifan Ma, Veysi Malikov, Chiling Chiang, Kwang Kwak, Yamin Fan, Paul Bertani, Jose Otero and Wu Lu also worked on the research.

Based on a story by Emily Caldwell

This Illustration from the December 15, 2016 Nature Biomedical Engineering article shows how CNP cell transfection triggers heat-shock, cell membrane repair, and autophagy mediated cellular responses. Illustration courtesy of UT Southwestern Medical Center Assistant Professor Zhaogang Yang (previously of Ohio State CBLE).
Wood’s startup accelerates biopharmaceutical development from bench to clinic

Chemical and Biomolecular Engineering Professor David Wood has been working with proteins for more than 20 years. But he’s not interested in their dietary benefits; rather it’s their key role in new therapies that attracts his attention.

As a graduate student at Rensselaer Polytechnic Institute, he helped develop an innovative recombinant protein purification system based on a self-cleaving affinity tag. Aided by a series of government research grants, including a DARPA award, Wood’s technology has been published extensively and is now protected by three patents.

Recombinant proteins form the basis of many biopharmaceuticals currently in widespread use for treatment of various life-threatening diseases, including cancer, autoimmune diseases, and diabetes, among others. These protein-based therapies are made in living cells grown in large bioreactors and have structures that are far larger, more complex, and more variable than the structure of synthetic chemical-based drugs.

“The sky’s the limit when the first biopharmaceutical drug gets approved with the Protein Capture Science technology as a key manufacturing platform in its production.”

– Professor David Wood, Founder, Protein Capture Science

A challenge in making those drugs safe for use in humans is the need to separate the therapeutic proteins from the thousands of other proteins associated with cells that are used to make them. According to Wood, these difficult purification procedures require substantial development efforts and ultimately represent the bulk of biopharmaceutical production costs. He and wife Izabela Gierach, a fellow chemical engineer who earned her MBA from The Ohio State University Fisher College of Business, recently launched a company to commercialize his self-cleaving affinity tag platform, which can greatly simplify and accelerate protein and protein fragment purification.

Reliable, consistent, predictable, and cost-effective protein purification platforms, with the smallest possible number of steps, are highly desirable for protein research and manufacturing. They can speed up research, get new molecules into the clinic faster, and decrease manufacturing costs, all of which can have a significant benefit to patients, Wood contends.

Licensed through The Ohio State University Corporate Engagement Office, Protein Capture Science, LLC, will develop, manufacture and directly distribute this unique technology to potential users in industry, academia, and government research laboratories throughout the world.

Last month in San Diego at the 19th Annual “PepTalk: The Protein Science Week,” Wood announced the company launch in an invited presentation, where he provided case studies on how the proprietary platform was used to successfully purify several target proteins.

Wood and Gierach also published a February 2019 article describing the self-cleaving tag and capture resin platform in American Pharmaceutical Review. The company is now taking presorders of their interin-based prepacked columns on their web site.

Wood emphasized that the technology would not have been possible without outstanding students—Joe Taris, Changlehua (Steven) Shi, Brian Marshall, and Jackeyln Gallardi, among others—and strong collaborations over the past 20 years.

Faculty News Briefs

Bhavik Baikhi earned news coverage and media appearances for his work in sustainable and environmental engineering, with interviews on Dec. 3rd’s edition of West Virginia Morning and WCMH-TV’s NBC4 special, “Benefits of Trees,” during which he discussed how trees and vegetation can help to economically reduce air pollution around industrial sites.

Stuart Cooper has been named a Fellow of the American Chemical Society, Polymer Division, for his work in polymer physics, block copolymers, ionomers, polyurethanes, and biomaterials. Cooper was among seven chemists and chemical engineers nationwide to receive the honor this year.

Nature Communications included the L.-S. Fan Group’s article, “Near 100% CD selectivity in nanoscaled iron-based oxygen carriers for chemical looping methane partial oxidation” in their Editors’ Highlights page, which is linked on the Nature Communications homepage. Graduate student Lang Qin is the second author.

The IIT Bombay-Ohio State Frontier Science and Engineering Research Center announced its inaugural Frontier Center Scholars Awards to six collaborative research teams, including a team led by Lisa M. Hall. Hall was also named director of The Ohio State University STEAM Factory, which facilitates research collaborations among diverse groups.

Li-Chiang Lin won two College of Engineering awards: the 2020 Lumenary Research Award and the student-nominated Charles E. MacQuigg Award for Outstanding Teaching. In May 2019, the International Adsorption Society recognized Lin with the triennial award, Excellence in Publications by a Young Member of the Society. He was recently named the first holder of the Unit S. Ozkan Professorship created by William G. Lowie (66).

Ohio State University College of Engineering Dean David B. Williams is now one of very few to be elected Honorary Fellow of the Royal Microscopical Society. Williams was recognized for research contributions leading to a new understanding of materials and microstructural evolution.
NSF Graduate Research Fellowships program recognizes students, alumna

Thomas Porter, a senior whose advisors are Professor Jessica Winter and Barbara Wyslouzil, and Vasiliki “Aliki” Kollopoulos (’18), a former student of Nicholas Brumell, have been awarded the 2020 NSF Graduate Research Fellowship, which is among the nation’s most competitive awards and represents a significant achievement.

Doctoral students Xiail Rima and Sabat Gonzalez-Serrano were honored with honorable mentions. The fellowship allows students to pursue research projects of their own choosing while minimizing the financial burden on their advisor.

Thomas Porter will use his National Science Foundation Graduate Research Fellowship to support his graduate research in biomaterials for cancer therapeutics. Porter’s goals include pursuing a Ph.D. in chemical engineering and teaching at the university level.

Last year, Thomas Porter won two prestigious awards: He was named a 2019 Barry M. Goldwater Scholar and a 2019-20 Astronaut Scholar by the Astronaut Scholarship Foundation. During his time at Ohio State, Thomas has been researching methods to improve quantum dot nanoparticles for biomedical imaging.

Vasiliki “Aliki” Kollopoulos, now a doctoral student at the University of Illinois at Urbana-Champaign, will use the fellowship to help fund her research under Dr. Brendan Harley. Her research focuses on using biomaterial strategies to modulate the kinetics of the immune response post-injury as a means to accelerate implant integration and subsequent bone regeneration.

In addition to the NSF GRF, during her Ph.D. career, she has also been a Chemical-Biology Interface Trainee, which is an NIH-funded training program. This program provides a platform for graduate students from various disciplines to come together for collaboration and networking.

As an Ohio State chemical engineering undergrad, Kollopoulos conducted research on DNA origami nanotechnology, which earned her an NSF Graduate Research Fellowship honorable mention last year. She won First Place, Undergraduate Student Poster Competition in the Food, Pharmaceutical, and Biotechnology division of the 2017 AIChE Annual Student Conference held in Minneapolis, MN.

Kollopoulos co-authored a publication in 2016 titled “Directing folding pathways for multi-component DNA origami nanostructures with complex topology.”

Student News Briefs

Undergraduate student Zahra Amin got involved with solar education and outreach, becoming the vice president and team captain of the Solar District Cup team. Her team became finalists in the nationwide competition for the Solar District Cup! This qualified them to represent Ohio State at the finalist conference in Atlanta, date to be determined.

Undergraduate student Maria Belicak, who interned at Marathon Petroleum last summer, won the Engineering Career Services 2020 Student Impact Award. This annual award is given to students who made an exemplary and unparalleled impact on a company during their time as a co-op or intern.

Ting-Yu Chen, a doctoral student in Winston Ho’s group, won a 2020 Elia Klein Founders’ Travel Supplement Award from the North American Membrane Society (NAMS) to present her paper “Synthesis of Sterically Hinder Polyevisamine and its Application in Facilitated Transport Membranes for CO2 Capture from Flue Gas” at the NAMS Annual Meeting.

At the 34th Annual Edward F. Hayes Graduate Research Forum in February, Elizabeth Jergens won First Place-Math, Physical Sciences, and Engineering-Poster Category for her project, “DNA-caged polymer nanocomposites for erasable fluorescence imaging.”

Reátegui Group member Xiail Rima (pictured at left) and Sabat Gonzalez-Serrano (Wood Group) were honored with honorable mentions in the NSF Graduate Research Fellowships competition. Rima’s research was recently featured by AIP Publishing as a “Sillight.” He approaches understanding of cell-to-cell interactions and promises large-scale cell patterning in microchannels, opening the door to easier fabrication of such arrays.

Undergraduate and first-author Ivan Pires and graduate students and cover artists Donald Belcher and Richard Hickey (all Palmer Group members), have their article “Novel Manufacturing method for producing aphomogoblin and its biophysical properties” featured on the cover of Biotechnology and Bioengineering.

In addition, Richard Hickey received the University Laboratory Safety Committee (ULSC) 2020 Excellence in Safety Award.

Undergraduate researcher earns Fulbright

Jacob Belding, a junior Eminence Fellow pursuing a chemical engineering degree, received a Fulbright-MITACS Globalink Grant to conduct research at McGill University in Montreal.

He will investigate atomistic simulations of electronic and energy materials. This is the inaugural year of the Fulbright-MITACS Globalink program, intended for U.S. students interested in going to Canada to undertake advanced research projects for 10 to 12 weeks between May and August.

Jacob is active in the American Institute of Chemical Engineers (AIChE) student chapter, serving as Professional Development Coordinator. He has wide-ranging interests and aspires to work with the production of sustainable energy. He has worked at Battelle Memorial Institute and Procter & Gamble, where he was assigned to a project to optimize the design of the standard 1 gallon bottle prominently used in P&G operations.

He currently works for the Department of Chemistry and Biochemistry, where he performs X-ray diffraction and UV-vis spectroscopy to characterize perovskite compounds for use in solar cell research. Read more about Jacob at gsosu.edu/Belding.

cbe.osu.edu
Alumni couple catalyze chemical engineers’ success

The future belongs to those who create it. Those are guiding words for alumnus Michael Triplett.

Having faced the 1980s’ collapse of the steel industry in his hometown of East Liverpool, Ohio, Triplett came to realize that he could deal with inevitable technological change, he had to be at the forefront of it.

The realization spurred him to earn Ohio State degrees in chemical engineering—first his bachelor’s (’97), and later his Ph.D. (’04). The first-generation college graduate has become a successful entrepreneur with a passion for translating science and technology into businesses and products that enhance human health, American competitiveness and economic opportunity.

Now he’s helping to ensure others can create bright futures for themselves and their communities.

Triplett and his wife Nanette Nardi Triplett—a first-generation college graduate from Demison, Ohio, and an Ohio State chemical engineering (’97) and Fisher MBA alum (’02)—recently donated $1.2 million to establish an endowed chemical engineering graduate fellowship at their alma mater.

The endowment, which is the first-ever fully-funded graduate fellowship in the department, will help recruit and support Ph.D. candidates, with a preference given to students from Ohio, to the William G. Lowrie Department of Chemical and Biomolecular Engineering.

“We couldn’t be more excited about the opportunity this generous fellowship provides chemical engineering graduate education at Ohio State,” said COE Distinguished Professor and Department Chair Unit Ozkan. “So often, funding becomes an issue when pairing a potential student with their ideal research area and the Tripletts’ support will eliminate that barrier for the foreseeable future.”

Competitiveness, from both an economic and technological standpoint, inspires Triplett.

“I’ve been motivated for a long time to facilitate the number of Americans, especially Ohioans, who go on to pursue STEM degrees, particularly engineering,” he said, adding that both he and Nanette believe chemical engineering is a discipline that can transcend many different fields and make significant contributions to society. And with Ozkan’s passion for elevating the program even higher, they felt confident investing in the next generation of Buckeye engineering leaders.

“We want to develop the pipeline of individuals who really lean into the most challenging and complex problems we face in our society that can be addressed from a chemical engineering perspective,” said Triplett. “We want them to have a positive impact that by extension benefits the department, the university and Ohio, if possible.”

Triplett is co-founder and CEO of Caramelx Biosciences, Inc., a biotech company pursuing novel therapies and vaccines for life-threatening bacterial infections, and president of Caramelx Partners, a life science commercialization and innovation consultancy. He co-founded and served as president and CEO of gene therapy company Myonexus Therapeutics, which was recently acquired by Sarepta Therapeutics in 2019.

The best way to create more Buckeye engineers-turned-entrepreneurs is to expose students to what it truly means to innovate, said Triplett, beyond what is seen on TV’s “Shark Tank.” Experiential opportunities with venture and startup companies, collaboration with Ohio State’s Keenan Center for Entrepreneurship and professional mentors, along with a world-class education, are all essential components.

“Ohio State has given us a tremendous opportunity. We feel a duty to capitalize on that opportunity, but also invest in the university and the state of Ohio,” said Triplett. “Nanette and I both hope that this gift serves as a catalyst for more gifts like this from others.”

“Based on a story by Maggie Bix

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AIChe students participated in several community/charitable events this year, including BuckeyeThon, a 24-hour dance marathon that raises funds for children at Nationwide Children’s Hospital.

Thirty-eight CBE students participated, helping to raise over $13,000 of the $1.6M brought in by Ohio State overall.

"It felt really amazing to be part of something that impacts so many lives," said AIChe President Josie Miller. "It was awesome to see the ChemE students come together for a cause, and it’s an experience I will never forget."