Transformative research. We have seen this term used more and more over the last two decades, spurred in part by its adoption by major funders like the National Science Foundation and the National Institute of Health. The phrase originated with physicist, historian, and philosopher of science Thomas Kuhn, who introduced the academic world to the idea of paradigm shifts that restructure and revolutionize scientific inquiry. Transformation is also a pillar of UNCG’s new strategic plan, which officially launched this year, on the 125th anniversary of the opening of our university.

But what does that transformation — of students, of our region, and of knowledge — look like?

With stories of refugee resettlement, new views on African art, bettering public health, improved educational outcomes, and more, this issue of UNCG Research illustrates just a few of the vast variety of approaches our university is employing on our path to achieving that lofty goal.

But what does that transformation — of students, of our region, and of knowledge — look like?

Whether it’s bringing high-tech methodologies like blockchain to old-world problems such as property ownership, or digging more deeply into bees’ own natural defenses to find solutions for modern agricultural challenges, transformative scholarship both demands different forms of knowing and results in different forms of knowing.

Methodology is key. New ways of knowing are found through interdisciplinary approaches, such as the Medicinal Chemistry Collaborative’s combination of differing viewpoints, specialties, and techniques. Another major driver is the collective impact that arises from community-engaged research, exemplified in our work on food security, where faculty and community partners are pooling understanding and effort to debunk myths, generate data to illuminate critical issues, and develop and implement solutions.

Transformation can also begin simply through the process of engaging in research. As the students highlighted in this issue have found, conducting research transforms researchers themselves. And, as partners in research, UNCG’s diverse students are also transforming the labs in which they work, our campus, and, ultimately, our workforce.

UNCG’s faculty, students, and community partners know that transformation demands cognitive flexibility, openness, struggle, and, yes, a little bit of luck. But as anyone witnessing our giant buzzworthy honey bee health.

The Harvest at Home

Money. Transportation. Know-how. There are lots of barriers to healthy eating. Researchers and community partners are taking a hard look at our food systems to ensure we have what our bodies need: food that’s good for us.

The United Nations, breastfeeding and social justice, and the Bible in Byzantium

For more information about research at UNCG and the Office of Research and Engagement, go to research.uncg.edu.
Levys' Zulu collection was inspired by Perrill's work. "The Nalas are the most famous family of contemporary Zulu ceramists to date," she says.

Above: Victor Ekpuk's "Divinity." Upper right: Perrill, seen through a screen digitally fabricated for the gallery and inspired by the NC Museum of Art and African modernist architecture. Lower right: Burnished earthenware by Zanele Nala, from the collection of Jane and Richard Levy. The gallery, which was funded through a $500,000 grant from the William R. Kenan Jr. Charitable Trust, also features a North Carolina wall dedicated to the state’s connections to African art. Currently, that display includes a collection from Bennett College — a historically black women’s college in Greensboro — that rivals the quality of objects at the Met, Perrill says.

In addition to studying African art itself, Perrill has become known for her work examining the life histories and cultural identities of Zulu artists — most often women. "Many people look at the aesthetics of art, but I want to know the backstory of exactly what informed the style," says Perrill, who has spent a decade getting to know artists personally, often staying in their homes.

This firsthand approach to research has given her an unrivaled expertise in the shifting hierarchies of the art marketplace. For instance, because many Zulu ceramic pieces are created for spiritual or utilitarian purposes, they were not considered art until the 1980s and 1990s. Even today, a discrepancy exists between what collectors define as "fine art" versus "folk art."

"It’s important to me to document the voices of women as artists and connect that to the art market and what it means to make African art," Perrill says. "Dealers have started to respond to the scholarship because they are alive and working.'" In the book she’s currently working on, tentatively titled "Burnished: Zulu Ceramics, Between Tradition and Abounds," and "Geometry and Abstraction" titles such as "Gold as Regalia," "Art Abounds," and "Geometry and Abstraction" are designed to "shake people out of their expectations of what African art is," Perrill says.

More than 100 of the pieces on display — including ceramics, textiles, jewelry, metal works, wooden sculptures, masquerade attire, beadwork, paintings, and multimedia collage — have never been seen before in a public exhibition or have not been exhibited in decades. One of the most contemporary pieces is a monumental chalk mural by Nigorian-born artist Victor Ekpuk, who now lives in Washington, D.C. During one week’s time, Ekpuk created the 30- by 18-foot mural, titled “Divinity.” Immigrants and refugees from Africa who now live in North Carolina have joined in conversations about the piece, which will remain up for one year. They will be invited to return and help Ekpuk erase the mural next year, in accordance with many African cultural traditions that celebrate art as ephemeral.

The gallery, which opened this past summer, is now triple the size of this gallery space. In particular, Perrill brings a specialized expertise in Zulu ceramics, with her seminal book on Zulu pottery now a touchstone for collectors and museums worldwide.

"We want visitors to recognize that Africa is an entire continent, and there are subtleties and complexities within each region," Perrill says. "As we become a destination state for African immigrants, we want all of North Carolina to understand the diversity of Africa," Perrill says. "We want visitors to recognize that Africa is an entire continent, and there are subtleties and complexities within each region."

Visitors to the gallery, which opened this past summer, are now greeted by a large map of Africa divided into regional sections. The exhibit’s focus areas are dedicated to specific kingdoms, regions, and aesthetic traditions spanning 16 centuries. Section titles such as "Gold as Regalia," "Art Abounds," "Geometry and Abstraction," and "Great Moments in Fine Art History" are designed to "shake people out of their expectations of what African art is," Perrill says.

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GREETINGS

Umoja gathering.

Refugees are expected to rapidly become self-sufficient. Umoja hopes to facilitate that process — with a particular focus on one of the most vulnerable populations, Congolese women.

Navigating the healthcare system isn’t easy. For Clementine Aulath, who immigrated to Greensboro from Central Africa three years ago, language and cultural barriers made health and financial decisions even harder.

UNC Greensboro, UNC Chapel Hill, and NC A&T State faculty are joining forces with Aulath and women like her in a community-engaged effort to ease these transitions.

Aulath is president of Umoja Women’s Group. Umoja — “unity” in Swahili — was launched in 2014 when a refugee resettlement agency caseworker noticed an influx of Congolese women who were single mothers and reached out to the UNCG Center for New North Carolinians, or CNNC, for advice.

“Our main purpose was to help women new to America adapt — so they don’t think they are alone,” Aulath explains in Swahili, interpreted by her son.

Nonprofits help refugees learn English and job skills, but federal funding for that support ceases after 90 to 180 days. Refugees are expected to rapidly become self-sufficient. Umoja hopes to facilitate that process — with a particular focus on one of the most vulnerable populations, Congolese women.

According to Pew Research Center, the Democratic Republic of Congo was the top source country for refugees resettled in

Refugees are expected to rapidly become self-sufficient. Umoja hopes to facilitate that process — with a particular focus on one of the most vulnerable populations, Congolese women.

According to Pew Research Center, the Democratic Republic of Congo was the top source country for refugees resettled in the U.S. in 2016. In addition to stresses and challenges facing all refugees, Congolese women are at particular risk because of the high incidence of sexual violence in their country of origin. A 2011 American Journal of Public Health study found up to 1.8 million Congolese women had experienced rape in their lifetimes. “The Congo is known as the worst place in the world to be a woman,” says CNNC director Dr. Holly Stenkiewicz.

Last November, the CNNC received Community Foundation of Greater Greensboro funding to implement an Umoja leadership and capacity-building initiative. The project includes plans for case management services, skill development workshops, and social support — all facilitated by Congolese refugee women — and aims to prepare participants for employment and economic independence.

“Our refugees come from circumstances we can’t imagine, and when they get here, their primary goal is, like everybody else, to take care of their families and to survive,” says UNCG associate professor of public health education Sharon Morrison.

The group of 35 women meet once a month, eat together, listen to speakers, celebrate life accomplishments, and provide social support. Dr. Morrison works with Dr. Rachel Buit (UNCG, human development and family studies), Dr. Maura Noemvu (NC A&T, social work), and Dr. Beth Marcoccio (UNC-CH, health behavior) to assess the group’s unique needs and connect it with community resources.

The interdisciplinary team focuses on child and maternal health, psychosocial issues, financial literacy, and household safety, with an emphasis on evidence-based practices.

A major accomplishment so far, Morrison says, is building trust between the vulnerable population and the faculty. The CNNC’s Natacha Nikokeza has been instrumental in building that bridge, she says.

Nikokeza immigrated to Greensboro from war-torn Burundi in 2008. She was trained at the United Nations Refugee Agency and as a resettlement assistant at World Relief.

Eventually, she wants to return to Burundi, but sometimes fall short, she says. “I’ve seen those gaps, and I’m trying to see if they can be filled.”

The group is transitioning to the next phase of a two-year planning process in which members will select leadership and move forward with personal and collective goals.

“Ultimately,” Nikokeza says, “we want the women to have the support and structures they need to be successful as they’ve defined success.”

By Elizabeth L. Harrison  •  Photography by Martin W. Kane

Learn more at https://cnnc.uncg.edu

By Tom Lassiter  •  Photography and illustration by Mike Dickens

Learn more at https://go.uncg.edu/nirkshetri

PEAK CONNECTIVITY

Contemplating how the newest technologies might improve the lives of individuals in developing nations is a joint theoretical exercise for Nir Kshetri, a professor in UNCG’s Bryan School of Business and Economics.

Dr. Kshetri, an authority on how digital technologies might be applied to improve the economic well-being of some of the world’s poorest people, grew up in a village in eastern Nepal, near Mount Everest. He knows the challenges of living in a place that lacks much of the governmental and financial infrastructure taken for granted in the industrialized world.

Consider blockchain, for instance. The heady technology, originally developed for cryptocurrency like Bitcoin, is currently a focus of the Bill and Melinda Gates Foundation. Like Kshetri, the Gates Foundation sees this secure, digital-mechanism as a means to improve millions of lives.

Blockchain, Kshetri explains, might be used to maintain land ownership records in places where Western-style deeds never existed. The information, stored on interconnected computers and accessed via smartphone, would be available to anyone. But the data could only be changed by the property owner or an assignee with access to the digital key for that specific record.

One of the thorniest challenges facing developing countries in the coming decade “is the registration of property,” Kshetri says. “It’s a big issue.”

Blockchain also has applications for identification and personal finance. “In Nepal, people have to show at least four different documents to open a bank account,” Kshetri says. “It’s almost impossible for them to participate in any type of formal banking activities.”

In a world of blockchain technology, he says, “a blockchain scheme might offer identity verification via a smartphone photo and an audio voiceprint. Such proof of identity would enable person-to-person transfer of funds at minimal expense, Kshetri says.

Some $5.5 billion people do not have access to banking or financial services, he notes, and 1.5 billion people have no form of identification. With no recorded deeds, property cannot be used as collateral to secure a loan to start a business. These conditions effectively exclude billions of people from participation in the 21st century economy.

Another aspect in Kshetri’s research focuses on the use of blockchain for digital currency like Bitcoin. Cryptocurrency, he points, could potentially provide billions with the tools to improve their livelihoods and build wealth.

Cryptocurrencies offer advantages over credit cards and bank-based financial transactions. Transaction costs of 10 percent or more in Pakistan have been reduced to 1.5 percent or less thanks to Bitcoin, he says.

Kshetri has published seven books and around 100 articles on subjects such as cloud computing, cybersecurity, big data, and the Internet of Things, and he is widely quoted as a technology authority. He is currently a consultant to the United Nations Conference on Trade and Development and its biannual series, Information Economy Report. Based in Geneva, UNCTAD seeks to enhance the capability of societies to engage in trade and development.

“Im just a regular guy interested in technology,” Kshetri says. “The advantage I have is that I was poor. I know the problems poor people face.”

By Tom Lassiter  •  Photography and illustration by Mike Dickens

Learn more at https://go.uncg.edu/nirkshetri
Kane wondered if differences in cognitive ability, specifically in working memory, might be a factor. Working memory indicates our ability to briefly store information necessary to reason through and solve problems. “In the lab, we generally see that people with higher working memory, mind wander less,” explains Kane. But, when Kane looked at results from the real world, lower working memory did not predict a daydreamer.

We think working memory is measuring, in part, your ability to control your attention only when you need to pay attention.” Higher working memory did predict less mind wandering during periods when subjects were trying hard to concentrate or doing challenging activities. It also correlated with more mind wandering when subjects weren’t trying to concentrate.

The best predictor of mind wandering in the field was a personality trait known as openness. “People high in openness were more likely to be daydreaming, or fantasizing, than people who were low in openness.” He explains that this personality predicts creative thoughts for the sake of entertainment if given the opportunity.

Kane is currently conducting a National Science Foundation study on mind wandering and learning. “We thought statistics would be an interesting domain to study,” he says. “In part because it’s important for science, but also because there are a lot of analytics about math.” The results of Kane’s current and future experiments are valuable to educators interested in designing a curriculum that maximizes a student’s retention.

By Rebecca Gamard  •  Photography by Mike Dickens
Learn more at https://ioby.uncg.edu/people/kane

In the last 15 years, African American females at UNCG graduated at a rate higher than any other group, followed by African American males. “I don’t know if it’s the best kept secret of our institution, but for the last 10 years, UNCG has essentially had no educational achievement gap as it relates to ethnicity,” says Dr. Joseph Green, executive director at UNCG’s Student Success Center.

A recent flow of funding proves that the university’s student-focused approach, leadership in undergraduate research, and track record for creating access for first-generation and underrepresented students is no secret.

In January, UNCG received $1 million from the National Science Foundation to enroll academically talented and financially challenged minority, female, and first-generation students seeking degrees in STEM, as part of the Science, Technology, and Math Preparation Scholarship (STAMPS) program.

In March, UNCG was selected for the Gates Foundation’s Frontier Set, joining 31 institutions across the country working to close achievement gaps in higher education. Participating institutions, already identified as pioneers in advancing student outcomes, partner and share best practices as they work to improve student success and transitions to the labor market.

In May, the university received a $1.4 million National Institutes of Health Maximizing Access to Research Careers Undergraduate Student Training in Academic Research (MARC U-STAR) grant to support underrepresented minority and disadvantaged students pursuing biomedical and behavioral health degrees.

And in September, UNCG was selected to host a $1.2 million McNair Postbaccalaureate Achievement Program to prepare first-generation, low-income, and underrepresented undergraduate students for doctoral studies.

“Think these awards demonstrate confidence in the university, in our commitment to provide quality educational experiences for all students,” says Dr. Leo Phillips, director of the Undergraduate Research, Scholarship, and Creativity Office.

This year, UNCG rolled out its new strategic plan, laying the groundwork for “giant steps” in transforming education by more strongly addressing the needs of a diverse student body.

UNCG is recognized as a designated minority-serving institution. Close to 68 percent of undergraduate students are female, 35 percent are considered an underrepresented minority, and 45 percent are Pell-Grant eligible. And the graduation rate for African American students at UNCG is 18.6 percent higher than the rate for African American students at its top 15 peer institutions.

“We are committed to all of our students being successful,” says Dr. Terri Shelton, vice chancellor for research and engagement. “But, in particular, we’ve begun to drill deep, using data and evidence-based practices, to look at how we close some of the gaps we see in retention and graduation rates, and how we respond to a lack of diversity in certain workforce opportunities.”

The university is using a combination of data and hands-on care to meet the different needs of students.

“’We encourage the use of ‘high-impact practices’ to promote learning,” says Provost and Executive Vice Chancellor Dana Dunn. “These are active-learning strategies that engage students and motivate them to succeed.”

Programs like STAMPS emphasize faculty and peer mentorship. “A lot of evidence suggests if students feel they are part of a community, they stay in school,” explains project director Dr. Lynn Sametz. The four-year graduation rate for an earlier version of the STAMPS program was 57 percent higher than UNCG’s average four-year graduation rate.

Undergraduate research is another high-impact practice that reaches through many UNCG initiatives, lying at the heart of programs like McNair and MARC U-STAR.

If we want diversity in STEM, disadvantaged students need access to research experiences and mentoring and information on navigating the system,” says Phillips.

Students aren’t the only ones receiving an education. Programs like MARC U-STAR also train faculty on how institutional racism manifests in STEM.

“We want to transform the culture on campus,” explains Dr. Dan Hert, a co-principal investigator on MARC U-STAR.

As students and faculty succeed in this endeavor, our economy and society will benefit, says Dunn. “We are in this together. Education is the promise of the future, and this work is key to achieving that promise.”

By Elizabeth L. Harrison  •  Illustration by Mike Dickens  •  Read in-depth coverage of our Frontier Set, MARC U-STAR, McNair, and STAMPS initiatives at https://research.uncg.edu/macro
Sex Ed goes VIRAL

Dr. Amanda Tanner examines sexual and reproductive health, with a focus on HIV infections among young people. She is widely known for her innovative, multi-method approaches to behavioral health and interventions. The associate professor of public health education, who also holds an appointment at Wake Forest University School of Medicine, attributes her success to a diverse, national network of research collaborators; strong, interdisciplinary teams of colleagues and students; and an emphasis on community engagement.

A NONTRADITIONAL PATH

“As a teenager, I witnessed how educational opportunities closed to young women who were pregnant. That inspired me to volunteer with a nonprofit bringing sex education to teenagers, and, after college, to join an international women’s health care organization. I loved the work and decided to get a master’s in public health to move forward with that career. Then, in grad school, I got involved in research and found my passion.

“My background keeps my feet on the ground. I’m committed to collaborating with communities and community-based organizations to ensure that my research is relevant to the populations I work with and can be implemented at an organizational and clinical level. I don’t want to work in an ivory tower, so UNC Greensboro’s dedication to community-engaged scholarship has been a great fit for me. We’re at the forefront of that type of work.

“Seeing my scholarship’s impact on interventions and policies and creating sustainable change — that’s what excites me.”

REFRAMING THE ISSUES

“While many of my projects focus on understanding and preventing HIV and STD transmission, more broadly my research is about promoting sexual and reproductive health — normal aspects of development. In my primary prevention work, we try to keep youth healthy and HIV-free. We don’t say, ‘Don’t have sex.’ We approach health from a risk reduction paradigm. We say, ‘Here are ways to be safe and healthy: use condoms, talk to your partner, get tested. Know your options.’

“I also do secondary prevention work with youth living with HIV. Thanks to biomedical advances, HIV is not the death sentence it used to be, and people who are infected can lead healthy, happy lives. Many people don’t know that once someone is virally suppressed with medication, their ability to transmit HIV becomes very, very small. It’s used to be, and people who are infected can lead healthy, happy lives. Many people don’t know that once someone is virally suppressed with medication, their ability to transmit HIV becomes very, very small. It’s

“Of the 1.2 million people living with HIV in the U.S. in 2011, 30 percent were virally suppressed with medication, and thus extremely unlikely to transmit. But when you look at virally suppressed young people, that number dropped to 10 percent. We’re seeing HIV rates decreasing for all age groups — except 13-19.

“We need to think about what we can do to support youth in accessing the services they need. There are factors we can change at the clinical level, at the more macro level, that really support healthier adolescents. If we train staff in adolescent clinics to meet youth where they are developmentally, if they are trained to interact with transgender youth, and so on, then young people with HIV are more likely to come to the clinic and stay in care.

“I’m leading an NIH study where we followed 135 youth at 14 clinical sites across the U.S., as they navigated the transition from adolescent to adult care — a time when we see a significant drop in adherence to treatment. We collected data from patients and clinic staff to try to better understand what’s happening. We’re identifying what youth need, what adolescent clinics can do to prepare youth for the transition, and what adult clinics can do to support them once they get there, so they stay engaged in care and on medication.”

COMMUNICATION AND CARE

“There are so many great new ways to share information. Technology is key to maximizing our resources and reach and developing cost-effective interventions.

“I’m currently working with a Wake Forest School of Medicine team on a project using social media to help young people living with HIV adhere to care and medication. That project, funded by the U.S. Health Resource Service Administration, focuses on young African American and Latino men who have sex with men and transgender women — populations often needing extra social support. We’re connecting them to health educators, who send reminders, answer questions, and check in with them, using texts and apps like Facebook and Grindr.

“We also have primary prevention projects using social media to spread information about health and HIV testing.

“I’m also developing an online intervention for first-year college students, funded by a National Institute of Alcoholism and Alcohol Abuse R01 grant, with a team from UNC and Penn State. The program addresses issues that arise where alcohol use and sexual behaviors intersect. A lot of similar curricula are high-resource, face-to-face interventions. Our program is something students can do easily, on their own, as part of orientation.”

A STRONGER WHOLE

“I want to build stronger, healthier communities, and reducing health disparities according to age, gender, sexual orientation, and race and ethnicity is part of that. When we have people, especially young people, who are unhealthy, that affects all of us.

“So when we invest in HIV prevention, treatment, and care, we don’t just affect individuals. We also see community- and population-level benefits. When we commit to making everyone as healthy as they can be, we make our world a better place.”

Interview by Sangeetha Shivaji, with Hope Voorhees

Learn more at https://go.uncg.edu/amandatanner
HITTING HIS STRIDE

Jason Moody, undergraduate researcher

It started with a rolled ankle during a daily run. That’s when undergraduate Jason Moody first thought about the body’s biomechanics. How did his ankle turn, and what did it mean? That question ultimately led him to the Department of Kinesiology, where he conducts research with Associate Professor Christopher Rhea and Assistant Professor Anne Brady. But he didn’t take a traditional path.

Moody’s winding journey started in high school, where he played football and wrestled. He wasn’t clear on his career goals, but, when he came to UNCG as a freshman, he decided to major in psychology and minor in theatre. Then, he took a break from school to intern at Walt Disney World, where he honed his communication skills, interacting with a wide variety of people. But Moody knew Disney wasn’t his destiny. As an avid runner, he shifted his focus to health and exercise, wondering whether he could help others live longer, healthier lives. “I don’t want to work with athletes,” he says. “I want to help older people with everyday activities, their everyday life—to help them be here for their grandchildren.”

When he — literally and figuratively — stumbled into kinesiology, Moody discovered UNCG has one of the strongest and fastest growing departments nationwide. He returned to campus and jumped into undergraduate research. Now, he works with older adults to improve their physical capabilities and stability. In Dr. Rhea’s lab, Moody partners with graduate researcher Brian Cone to help adults over 75 with trip training—an effort designed for fall prevention.

Falls are a leading cause of injury and death among older Americans, according to the Centers for Disease Control and Prevention. In 2015, Moody says, the cost related to falls for older adults totaled about $32 billion dollars. The team is testing whether putting participants through a 15-minute trip-training session can help them alter their walking patterns to avoid falls.

“When we’re kids, we constantly play and control our balance,” explains Moody’s mentor Rhea. “As we get older, one reason we fall more may be because we’re not putting ourselves in these unbalanced, unexpected situations anymore.” Trip training provides those situations.

Participants wear safety harnesses and motion-recording sensors. Researchers unexpectedly stop the treadmill eight times, simulating trips, and record data on how participants — unharmed thanks to the harness — recover. So far, Moody says, results show a single trip-training session results in gait improvement.

This past summer, he also helped Dr. Brady collect data at local retirement communities, assessing elements of resident health such as body composition, and respiratory data revealed perfectionists didn’t expend more effort on the task than other participants, in contrast to previous findings based on self-reporting. But maladaptive perfectionists did perceive the task as more difficult and felt worse about their performance.

For her dissertation, Harper, who’s already been published in the multidisciplinary journal PlosOne, hopes to collect data three times daily from 150 undergraduates on their interpersonal problems, through the UNCG Depression Treatment and Research Program. The program, directed by her advisor Dr. Kari Eddington, focuses on improving the lives of individuals living with depression via innovative research and clinical services. “I really want to help perfectionists. They are the ones who typically come in for psychotherapy,” the doctoral student says. “They are at a higher risk for any number of psychological problems—depression, anxiety, eating disorders, and personality disorders.”

Harper, who won the UNCG Outstanding Thesis Award in 2016, says maladaptive perfectionists have the highest levels of depression, social difficulties, and stress. They’re self-critical and often pursue goals based on external pressures rather than internal motivations, leading them to feel less pride in their work.

For her thesis, to determine if perfectionists worked harder than non-perfectionists, she had undergraduates perform a simple computer task while wearing electrodes. Cardiac and respiratory data revealed perfectionists didn’t expend more effort on the task than other participants, in contrast to previous findings based on self-reporting. But maladaptive perfectionists did perceive the task as more difficult and felt worse about their performance.

Harper has also analyzed how perfectionists feel about their daily accomplishments and why they pursue goals. In her most recent study, she surveyed 130 undergraduates about their daily progress toward goals, over a two-week period. She found maladaptive perfectionists pursued goals to satisfy others and felt more guilt, even if they were making progress.

But identifying behaviors and motivations is only part of her research. She also wants to create better treatments. Currently, psychologists use cognitive behavioral therapy, but this strategy doesn’t always have a specific focus on the sensitivity, hostility, neediness, and tendency toward conflict maladaptive perfectionism can create. Maladaptive perfectionists, Harper says, could benefit from cognitive behavior therapy tailored more specifically on social difficulties or more socially focused therapy.

For her dissertation, Harper, who’s already been published in the multidisciplinary journal PlosOne, hopes to collect data three times daily from 130 undergraduates on social interactions, how they feel about those interactions, and how they believe they will impact their future social experiences. She predicts maladaptive perfectionists will report more negative interactions and that they’ll blame themselves, which in turn will lead to an expectation of future negative social experiences and higher levels of loneliness.

The research is important, she says, because psychologists who understand maladaptive perfectionists’ approaches to social interactions can design better treatments.

“I hope my findings will be used to help perfectionists learn skills that will result in improved mental health,” she says. “These are skills that will make life better.”

By Whitney J. Palmer • Photography by Mike Dickens
Learn more at https://psyc.uncg.edu
NEWLY DISCOVERED MOLECULES that could prove to be anti-cancer agents.

Plant-derived compounds that could give us new ammunition against deadly drug-resistant bacteria such as MRSA.

Nanoparticles that might one day help doctors focus cancer drugs more precisely on tumors.

New drug candidates to minimize damage to the brain after a stroke.

That’s a small sample of the research that UNCG’s Medicinal Chemistry Collaborative — MC² — is carrying out.

And there’s certainly more where that came from. That’s what happens when you combine a couple dozen chemists, biochemists, biologists, and other scientists, plus their labs, students, and millions of dollars in research grants, together in a single center.

MC² has been around, under different names, for about 10 years. But the new name is part of an effort to draw in a wider array of researchers and provide the UNCG scientists involved with more chances to learn from one another.

“The goal is to support each other, and to train students, and to engage with the greater scientific community and the community in general,” says Professor Nadja Cech, who, along with Professor Nick Oberlies, is co-director of MC².

Sometimes that means one researcher saying something or sharing a story that sparks a new idea. Sometimes it means opportunities to collaborate and combine knowledge or access to special resources. Sometimes it means another colleague to ask for advice or finding the perfect mentor.

It certainly means high-impact research.
Oberlies and his collaborators hope to identify next-gen drugs in nature’s variety. “We went through 4,000 fungi, we isolated 400 compounds,” Oberlies says. “Fungi are the second most diverse organisms on the planet,” he explains. There are millions of unidentified fungal species — each one a treasure trove of unidentified compounds with the potential to improve health and save lives.

The chance of finding new molecules from these nanoparticles, doctors could potentially treat tissues deeper in the body, where longer-wavelength light can penetrate and then be converted to shorter wavelengths to activate the drug.

“Start out with a lot of different combinations of individual molecules and nanoparticles and then you whittle those down to the top performers, according to whatever screening procedure you’re using,” McFarland says.

A NUMBERS GAME

Dr. Oberlies and his students have spent a lot of time wading through streams and ponds in parks around North Carolina, collecting fungi. They take them back to the lab, grow and analyze them, and start looking for new molecules that might have therapeutic or other practical applications.

“Fungi are the second most diverse organisms on the planet,” Oberlies says. Scientists estimate there are millions of species, but only about 120,000 have been named. In fact, Oberlies and his team frequently find new species; recently they discovered a whole new order of fungi.

In the last decade, Oberlies says, his lab has collected and analyzed thousands of fungal species, isolated and determined the structures of hundreds of new compounds from those fungi, and then tested those using biological assays to see which might have medicinal value.

He’s also able to tap the expertise and resources of another professor, Cedric Pearce, an adjunct faculty member and CEO of Hillsborough-based biotech company Mycosynthetix Inc. That company maintains a library of over 55,000 fungal species collected from around the world.

In what way, and how they collectively do a better job of wiping out bacteria.”

McFarland and her collaborators have developed a light-responsive bladder cancer drug that is now in human clinical trials with Theralase Technologies. They’re also collaborating with the company to develop drugs to treat glioblastoma, a type of brain cancer.

In drug development, finding a compound that might have therapeutic properties is only half the battle. Researchers must still be able to make enough of the substance to test it. And if it ends up being approved for use in humans, drug makers must also figure out how to produce large quantities of it.

That’s one of the things that Mitch Crotty, associate professor of organic chemistry and the head of the Department of Chemistry & Biochemistry, does.

Dr. Sherri McFarland, who joined the Department of Chemistry & Biochemistry a year ago, is focused on photodynamic therapy, using light energy to activate or strengthen therapeutic compounds in the body.

She and her partners have founded a company — Photodynamic Inc. — based on light-responsive natural products that can eliminate oral biofilms, which are associated with cavities and gum disease. They’ve also licensed a light-responsive bladder cancer drug to another company; that treatment is now in human trials.

For her work at UNCG, the professor is turning her attention to nanophotomedicine.

One of the challenges with some photodynamic applications, she says, is that not all wavelengths of light are equally effective. Sometimes, the frequencies that penetrate tissues the best don’t carry enough energy to activate light-sensitive, therapeutic compounds to attack cancers.

But some types of nanoparticles — very tiny particles with specific chemical structures — can “up-convert” the light, absorbing a lower-energy photon and then emitting a high-energy photon. That new, high-energy light has enough energy to activate the therapeutic compound.

“The idea is we could then treat larger tumor volumes,” McFarland says. By combining light-therapeutic compounds with these nanoparticles, doctors could potentially treat tissues deeper in the body, where longer-wavelength light can penetrate and then be converted to shorter wavelengths to activate the drug.

“Start out with a lot of different combinations of individual molecules and nanoparticles and then you whittle those down to the top performers, according to whatever screening procedure you’re using,” McFarland says.

Combinations that work successfully in the lab will go on to further testing. They could also form the basis of new companies that could be spun out of McFarland’s lab.

SCALABLE SYNTHESIS

In drug development, finding a compound that might have therapeutic properties is only half the battle. Researchers must still be able to make enough of the substance to test it. And if it ends up being approved for use in humans, drug makers must also figure out how to produce large quantities of it.

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Patricia A. Sullivan Distinguished Professorships in the Sciences.

In July, Cech and Oberlies became inaugural recipients of the award, which “recognizes the impact on society.”

“I just want to do something that positively affects people,” Cech says. “I believe in the power of discovery, this is the idea that animates his work: To find something that we didn’t know existed, and then figure out how to use it to better ourselves.”

For Oberlies, who has always seen science as a process that “can’t be contained,” it’s about doing something that “has a purpose by the Pacific yew tree.”

You might say that Cech and Oberlies are connected to their students through a shared love of chemistry. Oberlies learned about the yew tree a different way, from her mentor, Dr. Monroe Wall. Those scientists are known around the world because they derived Taxol, an important cancer drug, from the bark of the Pacific yew.

For Cech, a chemistry professor at UNCG, the connection is personal. She needed someone who knew about natural products to help her with her chemistry program. Oberlies, who runs the Natural Products Laboratory at the Research Triangle Institute in North Carolina, was the perfect fit.

“She was always accessible, she connected with me,” says Cech. “She has pushed me past what I had considered my limits.”

Beyond the opportunity to do cutting edge research, Jones says, the mentorship from McFarland is also invaluable.

“I feel like one of the most fortunate people alive to be working with her,” he says. “She has pushed me past what I had considered my limits.”

The recognition of Cech and Oberlies' contributions is a testament to the importance of natural products research and the impact it can have on society.

NEXT GENERATION SCIENTISTS

UNCG faculty take their responsibilities to teach students and mentor future scientists seriously.

Derick Jones, a doctoral student in medicinal biochemistry, works in the McFarland lab. One of his primary duties is to work with cancer cell lines. He grows the cancer cells that are used to test drug candidate compounds in test tubes. Then he observes the way the cancer cells interact with the compounds and identifies which ones are effective.

“We have state of the art instruments and technology that are available for us to use,” he says. “We can test the compounds to (hopefully) kill those cancer cells.”

Beyond the opportunity to do cutting edge research, Jones says, the mentorship from McFarland is also invaluable.

“I feel like one of the most fortunate people alive to be working with her,” he says. “She has pushed me past what I had considered my limits.”

MC2 faculty also work closely with undergraduates. Biochemistry major Luis Mejia Cruz has been working in Cech's lab to better understand how certain compounds combat MRSA.

“I was involved in all of the processes, from sample preparation, culturing the strains of bacteria, to running the bioassays and screening them using analytical instruments such as high-performance liquid chromatography and mass spectrometry systems, as well as processing the data,” he says.

Mejia Cruz plans to pursue a master's degree in chemistry and one day work as a research scientist, perhaps in medicinal chemistry.

For Oberlies, who has always seen science as a process of discovery, it’s the idea that animates his work. It’s finding something that makes a difference.

“I just want to do something that positively affects humanity,” he says. “You’re doing it because you want to have an impact on society.”

In July, Cech and Oberlies became inaugural recipients of the Patricia A. Sullivan Distinguished Professorships in the Sciences.

“We make molecules,” he says. “The approach that guides us is to try to make compounds in as few steps as possible. This reduces the time, waste, and cost of a synthesis.”

For one project, Dr. Croatt created a new process — nine steps instead of 15 — to synthesize isocarbacyclin analogues, starting with simple, inexpensive materials. Collaborators at the Stanford University School of Medicine are testing them. Early results suggest they could minimize brain damage after a stroke.

Croatt says one of the most valuable aspects of MC2 is the synergy created by the interaction among the scientists.

“By talking and sharing research results, we can help one another by either directly collaborating or simply giving advice,” he says. Six of his last eight published papers were collaborations with other MC2 members.

For example, he’s working with Cech and Oberlies to isolate compounds from fungi that may have anti-cancer effects, and then optimize the structure of these molecules. Science, Oberlies notes, “is all about teamwork.”

That teamwork extends far beyond the relationships among faculty.

MC2 also has strong community outreach programs, including the STEM (Science, Technology, Engineering, and Mathematics) Pipeline.

“The Pipeline program was created to provide students with valuable hands-on research experience while they are in high school,” says Meng Yang, a postdoctoral researcher in the McFarland lab.

“By working with students on real research projects, we can help them see the potential for a career in science,” Yang says. “We also work with local schools to provide outreach programs and workshops.”

In addition to the Pipeline program, MC2 also has a Summer Research Program for high school students.

“This program provides an opportunity for high school students to experience research in the sciences, and to see what it’s like to work with professionals in the field,” says Yang. “It’s been a huge success.”

“By giving students the chance to work with us, we hope to inspire them to pursue careers in science,” says Cech. “We want to show them that science is not just for the professionals — it’s for everyone.”

By Mark Tosczak  •  Photography by Martin W. Kane

Learn more at https://mcsquared.uncg.edu
HE JUST WANTED TO GO TO THE GROCERY STORE. But for Gai Riak, who immigrated to the United States from Kenya in 2001, it wasn’t as easy as you’d think. For starters, Riak didn’t have a car. He studied maps and schedules in a foreign tongue and learned the bus system for his first trip. Then, when he arrived — at a store much bigger than anything he was accustomed to — the aisles of packaged items and unrecognizable produce left him overwhelmed and confused. “The food is not the same as the food we get back home,” he says. Labels and price tags meant nothing to him.

Over time, Riak learned the ropes, but without reliable transportation, his trips to the grocery store remained infrequent. “I would buy a lot of nonperishable foods because I never knew when I would have an opportunity to come back,” he says. Rarely did Riak leave with fresh fruits and vegetables.

Grocery shopping challenges like Riak’s impact more than immigrants. Two years ago, Greensboro received a startling distinction: Out of the top 100 major metropolitan cities in the U.S., the Greensboro-High Point area ranked number one for residents experiencing “food hardship.”

Food hardship speaks to a person’s financial ability to buy food, explains Marianne LeGreco, associate professor of communication studies. But hardship, she says, isn’t really the whole story.

Dr. LeGreco mobilizes conversations around food, challenging her students and community partners to look at the problem through a wider lens. To truly address issues of hunger and health, she says, we have to look at “food security,” which puts the focus on physical as well as economic access to food, and on issues such as nutrition and education.

“When we talk about food security, we take a broader look at our food systems,” she says. “That helps us implement true, lasting solutions.”

LeGreco is working to increase food security by uniting organizations with shared goals — from university researchers to community organizations to faith-based groups — who are tackling the problem from different angles.

“One of the things we did was to mobilize people to start paying attention to food deserts and food insecurity in the community — and more.”

WATERING FOOD DESERTS

As a communication expert, LeGreco understands that the way we talk about food impacts the solutions we put in place.

For example, “there’s a difference between availability of and access to food,” she explains. In North Carolina, fresh vegetables and many fruits are available year-round. “At the very least, you can grow sweet potatoes. Pound for pound, calorie for calorie, that’s one of the best foods you can eat,” LeGreco says.

But while food may be available in Guilford County, it’s not always accessible — at least not to everybody. Many residents live in “food deserts,” which the U.S. Department of Agriculture defines as areas in which most residents live more than a mile from a grocery store, and below the poverty line.

People living in food deserts can feel stuck there. Like Riak, residents are not in walking distance to a grocery store, and some cannot afford transportation.

“The idea of ‘access’ seems easy to wrap our minds around,” LeGreco says. “And we think we can fix that easily by starting a food pantry, a community garden, or a mobile market. But really, there’s more to it than that.”

This is where the rhetoric we use when trying to solve problems around food becomes especially important, she adds. Increasing physical access to nourishing foods doesn’t always get at the root of accessibility.

“For example, I’ve had several study participants tell me that they would eat better if they knew how to cook. When you’ve grown up in an area where you have access to only convenience foods, you might have never learned to cook,” LeGreco says.

If you give it a try, you run the risk of making a mistake. Suppose you invest in ingredients for a casserole and you drop or burn the casserole while preparing it. “Someone like me might be able to recover from that. I might go out to dinner that night or go buy a replacement ingredient,” she says. “But not everyone has that privilege. Some folks might not eat that night.”

In 2014, LeGreco partnered with the Guilford County Department of Public Health and numerous community partners to launch the Mobile Oasis Farmers Market. This farmers market on wheels provides fresh, local food to people living in food deserts. Even though the market has had a huge success — Guilford College now operates four locations, including one at a local community health clinic, and it won the 2015 According to the U.S. Department of Agriculture, food insecurity is an economic and social condition of limited or uncertain access to adequate food. Food insecurity includes issues beyond simple hunger, such as levels of food intake and nutrition.
LeGreco is not the only UNCG researcher focused on food issues. Jigna Dharod, an associate professor of nutrition and a fellow with the UNCG Center for New North Carolinians, works with two seemingly unrelated populations — U.S.-born, low-income women with children, and immigrants and refugees — who both struggle to buy and prepare nourishing food for themselves and their families.

Dr. Dharod has found that rates of food insecurity are far above average in both populations — "even among pregnant women, who are in what is supposed to be a protected stage of life," she says. For these groups, Dharod says, food insecurity is associated with a higher intake of sugar-sweetened beverages and meat, and a low intake of nutrient-dense foods such as fruits and vegetables.

LeGreco is working to help her community create a strong, sustainable food system that goes a step further than availability and access — to support.

LeGreco found that depression during pregnancy is significantly higher among food-insecure women. Currently, she is working with Cone Pediatrics to investigate how food insecurity affects breastfeeding initiation and other infant-feeding practices.

The majority of the women interviewed were obese or overweight prior to becoming pregnant, and an even larger majority experienced unhealthy levels of weight gain during their pregnancies. Because weight gain during pregnancy is a significant predictor of both postpartum weight retention and childhood obesity, says Dharod, pregnancy is a crucial time for interventions related to food insecurity. "We have the potential to avert two generations of obesity," Dharod’s research findings are making waves at home. Local nonprofits and resettlement agencies have learned the importance of extending their training to include food-related issues. A Guilford College program with ties to UNCG’s Center for New North Carolinians began delivering fruits and vegetables grown on campus to refugee neighborhoods. And NC A&T opened its farm for refugees to harvest fresh produce. "These women come from farming backgrounds, so they were thrilled to have the opportunity," Dharod says.

Dharod’s team also implemented a farmers market at a local WIC office. The project, which won the Catawba County Government Team Achievement Award in Health from the National Association of Counties — LeGreco points to a key lesson she and her partners learned from data they collected over two years. "Increasing access to healthier food options alone doesn’t guarantee that people are actually going to use them," she says.

However, they found that increasing access alongside other health resources does encourage participation. "We had much more return business when one of our community members offered recipes and taste tests so that people could know what to do with a butternut squash, or different ways to incorporate ingredients," LeGreco says. "We provided those supports, so started to see the creation of community because people would come back."

LeGreco and her team tracked the participation of 644 Mobile Oasis customers using a web-based app and conducted hundreds of on-site interviews. Forty-three percent of those interviewed said they liked the market because it created a space to meet people. "Markets are spaces to meet friends, share recipes, and engage in some important social support practices," says LeGreco.

The takeaway for policymakers? "When we incentivize grocery stores to come into particular neighborhoods, we’re not only capturing the entire problem. We might be doing a lot to create access to resources that people can’t immediately use," LeGreco says. "It can be far easier to build a store than to fix other problems like a lack of social support or a lack of knowledge or time to cook."
Her timeline includes projects such as Kitchen Connects GSO and the Mobile Oasis Farmers Market, which are only successful if they meet the needs of the cities they’re designed to serve. “To identify immediate impacts, researchers can survey people who use these programs. “But you also have to look at the bigger picture,” LeGreco says. “Sometimes it takes a long time to get from idea to implementation to impact, so we need to look at what else is going on in the food system while these programs are being developed.”

To that end, LeGreco is partnering with other UNCG faculty in areas such as kinesiology, nutrition, and sociology — and community stakeholders such as local hospitals and health agencies — to develop common goals and research tools that help communities track and monitor healthy eating, physical activity, and local food systems and determine when projects are successful.

“At the basic level, we as communities need to work to ensure everybody has access to food, water, and shelter,” LeGreco asserts. “Greensboro does a lot of economic development by attracting new people and companies to come here. We talk about our diversity, and how we are a great home to immigrants and refugees.”

But when Greensboro also appears on a list of communities with high food insecurity, it shows that people still struggle. “We have to take care of each other once we are here,” LeGreco says. “No matter if you were born in the U.S. or not, and no matter your economic and cultural background, we really have to walk the walk when it comes to making sure this is a good place to live and raise our families.”

In 2011, LeGreco worked with Guilford County Department of Public Health epidemiologist Mark Smith and a 36-member task force from Greensboro’s Warnersville community, to identify resources to improve the health of community residents. That task force’s work laid the foundation for the Warnersville Urban Garden, which has supplied more than 2,500 pounds of food directly to the community, to local nonprofits such as Share the Harvest and Greensboro Urban Ministry, and to the Mobile Oasis Farmers Market.

Across departments and disciplines, faculty at UNCG are partnering with community stakeholders to solve challenges around food. These researchers don’t develop solutions for the community. They work with the community to identify problems and design solutions together. Below are just a few of the initiatives that UNCG supports.

**KITCHEN CONNECTS GSO**

Turning a garden full of cucumbers into a grocery store shelf stocked with pickles may seem like a pipe dream for an entrepreneurial gardener, but that’s the kind of idea brought to fruition through the Kitchen Connects GSO program, a collaboration among the Greensboro Farmers Curb Market, the nonprofit Out of the Garden Project, and Guilford County Cooperative Extension. Stephen Sills, an associate professor of sociology who directs UNCG’s Center for Housing and Community Studies, and LeGreco are partnering to collect data about the shared-use kitchen project to track its impact for the project funders, the City of Greensboro and the U.S. Department of Agriculture.

**MONTAGNARD HYPERTENSION RESEARCH PROJECT**

When leaders from Greensboro’s Montagnard refugee community asked area higher education institutions to partner with them to address widespread hypertension and other chronic health conditions, Dr. Sharon Morrison and Dr. Sudha Shreenivas developed the Montagnard Hypertension Research Project. The associate professors from the Department of Public Health Education and the Department of Human Development and Family Studies are leading an interdisciplinary team that examines a variety of factors contributing to the community’s health, including food insecurity.

**PROJECT GREEN LEAF**

Anthropology professor Susan Andreaotta developed Project Green Leaf over fifteen years ago as a way to strengthen ties between small-scale farmers and consumers. Over the years, project participants have worked to support the local food system and local agriculture with strategies that include direct marketing and educational and outreach programs. Students also get a chance to get their hands dirty and practice what they’ve learned in UNCG’s Campus Gardens, which Dr. Andreaotta co-directs.
DOZENS OF YOUNG HONEY BEES swirled and buzzed through the air on the warm, late June day. The two undergraduates, though, weren’t sure how to proceed. Collecting bees for research purposes isn’t covered in most classes.

UNCG’s Sara Rubio Correa and Erin Estes, a Northern Michigan University ecology and mathematics major visiting UNCG for the summer Math-Bio Research Experience for Undergraduates program, asked Professor of Biology Olav Rueppell for help. Dr. Rueppell, who runs UNCG’s Social Insect Lab, was happy to demonstrate.

He eschewed the beekeeper’s hood and other protective gear and seemed oblivious to the dozens of bees swirling around him. Young bees like this, it turns out, rarely sting.
Removing a frame of honeycomb from the hive, he gently knocked some of the bees into a plastic funnel. They fell through the funnel into a clear plastic cup — the kind you might otherwise use for an iced latte on a day like this.

The two students observed from several feet away. He moved briskly, and in less than a minute they had collected several cups of bees for the two students to take back to the lab.

A Hive of Activity

From left to right: Wagoner, Rueppell, and undergraduate researcher Christopher Reid work with honey bee brood (eggs, larvae, and pupae) to test for hygienic behavior. Master’s student Taylor Reams examines a worker bee under a stereomicroscope. Postdoctoral researcher Esmirll Amdt discusses a molecular test for immaturity with an undergraduate.

This year, the Rueppell lab won a $999,000 U.S. Department of Agriculture grant to continue its varroa mite research. They’ll collaborate with three other universities, extension specialists, and beekeepers in North Carolina and Minnesota to test their innovations and share lessons learned. The ultimate goal is to help the honey bee industry nationally and globally.

A Hive of Research

The lab is quiet — no buzzing here — but still busy. An undergraduate, biology major Suman Ratn, is entering data into a spreadsheet about the survival rates of different groups of bees from Bhatia’s research.

A few feet away at a lab bench, doctoral candidate Carlos Vega Melendez is showing another undergraduate, biology major Kevin Le, how to measure the size of honey bee eggs photographed through a microscope. Vega Melendez’s own research looks at how gene expression changes in bees when they’re exposed to stress at different stages in their egg-larva-pupa-adult life cycle.

In this case, they’re stressed by exposing them to higher-than-normal temperatures — about 113 degrees Fahrenheit. “The wild bee is not the same as those that we are studying,” says Vega Melendez, who’s been working with Rueppell for four years and plans to finish his PhD by December 2018. “Some intriguing genes were overexpressed in the stressed bees,” he explains.

That in turn leads to other questions: Are stressed bees more or less vulnerable to disease? Does their behavior change, and if so, does it do so in ways that are helpful or harmful to the overall health of the colony?

The work in Rueppell’s lab follows two rails of research.

First, he wants to better understand fundamental biological problems, such as how genes influence behavior. Honey bees, which are social insects, had their genome fully sequenced more than 10 years ago, and so are a good organism for this kind of research. The insights gained can be translated to other organisms, from ants to human beings.

Second, Rueppell believes that by better understanding how genes and the environment interact in honey bees, he and other researchers may be able to help beekeepers keep their hives healthier, and therefore help us all.

HIVES OF ACTIVITY

Humans have worked with bees for centuries, harvesting honey and beeswax. But in the last decade or so, bee populations have declined markedly. Colony collapse disorder, where most worker bees disappear from a hive and leave the queen to fend for herself, is just one well known but poorly understood cause.

“Colony collapse disorder is sort of the tip of the iceberg,” says Rueppell. He ticks off a range of other problems: less diverse food sources, pesticides, diseases and mites, and lifestyle-related stress.

Lifestyle-related stress? For insects? We’ll get back to that.

A Sticky Problem

Rueppell and his students aren’t the only ones concerned about bee health. Beekeepers typically lose 20 to 40 percent of their bees each year — millions of bees for a single commercial beekeeper.

These losses threaten their business model and our food supply. That’s because honey bees do a lot more than just make honey. In fact, making honey is just a nice side benefit of their arguably more important function: pollinating billions of dollars of produce each year.

“There are thousands of wild bees in the U.S. as well, and their value is quite important,” Rueppell says. “But in the agricultural landscape that we have modified so extensively, most of these wild pollinators can’t survive. We have to rely on the honey bee for at least a good part of the pollination services.”

Go into the produce section of a grocery store and look around; without honey bees, many of the fruits and vegetables you see simply wouldn’t be there. By some estimates, honey bees add about $35 billion in value to U.S. food production each year.

Commercial beekeepers, who can own thousands of hives, transport hives across the country to farms to pollinate crops such as broccoli, peppers, and almond groves each year.

This brings us to the matter of bee lifestyle.

“The commercial bees get shipped all over the place in trucks,” Rueppell says. “They are usually kept in very high density conditions, where 20 or 30 bee colonies are right next to each other.

“If you think about the naturally evolved context, they lived in tree cavities and the next colony was a mile away.”

Imagine how you’d feel if you grew up in a small, rural town where you knew everyone, and then you were relocated to New York City and forced to live in a crowded, noisy high-rise. You’d be stressed, too. Bees, however, can’t take exits or flyways.

In addition, their agriculture use means that many bee hives get most of their nutrition from a single crop or a small number of crops, rather than the diversity of plants they’d encounter in the wild. And they can be exposed to pesticides. It’s tough to be a honey bee these days.

“These beekeepers are doing a fantastic job and helping beekeepers keep their hives under control,” Rueppell says. “But how do bees know when to do this? It brings us to the matter of bee lifestyle.

Work in Rueppell’s lab by PhD-candidate-turned-postdoc Kaira Wagoner may turn into one of those tools. To understand Viagoner’s research, you must understand one of the biggest threats honey bees face: varroa mites.

The mites, also called Varroa destructor, are tiny, rust-colored arachnids, just barely big enough to be seen with the naked eye. They prey on bee larvae, sucking their blood when the larvae are defenseless in the cells of honeycombs. Not only do varroa harm and sometimes kill bees in the larval stage, they also transmit deadly viruses. If you can stop the varroa, you can protect bees from the mites and from the diseases they carry. Some treatments, such as pesticides, can potentially hurt bees. Wagoner discovered something that may be much better.

For her doctoral dissertation, she studied bee hygienic behavior. Worker bees sometimes open honeycomb cells that contain larvae and, if they find mites, remove the parasitized larva. But how do bees know when to do this? That is the big question.

To study this, Wagoner identified a chemical signal — a biochemical component in honey bees that makes them susceptible to disease. If further studies prove out, it may provide beekeepers a new way to protect their hives from varroa mites.

“Most beekeepers are using pesticides to control varroa mites,” Rueppell says. “But they’re running out of tools. We need easy, long-term, sustainable solutions for improving honey bee health.”

Cleaning Up Mites

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TO BREED BETTER BEES

Humans have been breeding bees for probably centuries. “Even looking at today’s bees, we can see the impact of selection,” Rueppell says. “Beeskeepers want docile bees that produce lots of honey.”

But some of those breeding decisions may have had unintended consequences for bee health. Take the push for honey, for example. Modern honey bees have been selected in part to maximize how much honey they produce. Since they produce more honey, that means they gather less of a substance called propolis, Rueppell says.

Propolis is a sticky, resin-like substance bees collect from plants. They use it to seal off cracks in their hives. But because it’s sticky and goopy, it tends to get all over beekeeping equipment and make it tougher for keepers to maintain their hives. But, Rueppell says, research shows that propolis has antimicrobial properties and helps keep bee colonies healthy. “So maybe we have to breed that back into the bees,” Rueppell says.

The idea that we can breed stronger, healthier bees is an important one that Rueppell and his students are approaching from multiple angles. The mapping of the honey bee genome allows them and other bee researchers to look at bee traits in a very precise way.

Another tactic that’s getting a lot of attention is breeding bees that are more disease resistant. Bhatia’s research could be applicable produces its own challenges, Rueppell says. “At the moment, the selection scheme for making hygienic bees is very labor intensive,” he says. “It involves liquid nitrogen.” That’s where Rueppell and the young scientists he’s educating in his lab come in.

“There’s a lot of talk about breeding healthy honey bees at the moment and increasing their natural defenses through selective breeding,” Rueppell says. “But you have to understand the genetic architecture and the constraints that the system has for breeding. There’s a lot you need to know to be successful in creating those breeding programs.”

The students and researchers in Rueppell’s lab, from undergraduates to postdocs, all have a role to play — a bit like bee traits in a hive. Many of them — perhaps most of them — will go on to something besides honey bees. But before they do, they will have learned some science and contributed a bit of new knowledge to what we know about honey bees.

And they will take with them new skills and valuable experience, no matter where they go when they fly off to the next step in their careers. “I learned how to design and conduct a research project from beginning to end,” says undergrad Rubin Correa of her summer in Rueppell’s lab. “I now have an understanding of what a researcher does.”

She also discovered that, regardless of what your seasoned bee-researcher professor does, you don’t have to follow his example when it comes to protective clothing while working with bees. “Fear only came along when bees were old enough to fly and could sting,” she says. “As long as I had the proper clothing, my fear would dissipate.”

By Mark Tosczak • Photography by Martin W. Kane

Learn more at https://biology.uncg.edu/people/olav-rueppell

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SUMMER OF SCIENCE

In addition to mentoring UNCG students in his lab, Rueppell also serves as co-principal investigator, with Mathematics Professor Jan Rychtář, on the National Science Foundation-funded Math-Bio Research Experience for Undergraduates. Hundreds of students across the country apply to participate in the selective, interdisciplinary summer program at UNCG that gives undergraduates hands-on research experience and the opportunity to help solve scientific problems at the intersection of biology and mathematics.
The United Nations was chartered in 1945, following the end of World War II. The organization is often depicted as an attempt to make right the shortcomings of Woodrow Wilson’s League of Nations. The league, created following World War I, had failed in its mission to prevent war through collective security and to resolve disputes between states through negotiation and arbitration. But was the U.N. really a new idea? Jerry Pubantz, professor of political science and an authority on the United Nations, holds that the roots of the U.N. can be traced to the late 18th century.

“The U.N. is an evolutionary outcome of a process that began in the Enlightenment,” says Dr. Pubantz. He and longtime collaborator John Moore, a professor of diplomatic history at California State Polytechnic University, have produced several books on the U.N. Their latest is a significantly updated second edition, “The New United Nations: International Organization in the Twenty-First Century.”

In 1795, the German philosopher Immanuel Kant published a slim volume titled “Perpetual Peace.” That book, Pubantz says, lays out Kant’s “formula for decreasing the number of wars and moving toward a peaceful world.”

Kant’s “formula” for the U.N. charter was drafted 75 years ago.

Prominently missing from the U.N. charter is the term “peacekeeping.” Yet that function has become a vital U.N. mission. The U.N. currently has around 100,000 peacekeepers serving in 15 missions, but only about 3,000 U.S. troops serve as peacekeepers wearing the U.N.’s signature blue helmets.

Though the U.N. headquarters are in New York, the organization is absent from the daily lives of most Americans, Pubantz says. That’s not so in developing nations and hotspots such as Haiti, the Democratic Republic of the Congo, Kosovo, and Syria. Large segments of the world’s population see blue-helmeted peacekeepers or are served by U.N. agencies every day.

Now, as in 1945, Pubantz says, “The U.N. seeks to foster world peace despite the existence of national sovereignty. It’s very hard, as George W. Bush found, to operate in the world and succeed without turning to the U.N. at various points.”

The U.N. is rather atypically with Americans these days, continuing a trend that began during the Reagan era. But it wasn’t always so.

“It’s ironic because it was an American creation, founded in large part by the U.S. State Department and promoted by the Eisenhower administration,” says Pubantz. “Its headquarters are in our country for that reason.”

In researching a book examining U.S. presidents and the U.N., Pubantz read all of Harry S. Truman’s 1948 stump speeches. “He began each one by boasting how great the U.N. was, and how we needed to make it work. Can you imagine an American candidate doing that today?”


FEEDING EQUALITY

The right to breastfeed isn’t only about feeding babies. It’s also about reproductive rights, gender equality, and social justice.

“We want mothers to be able to work and we want them to be able to participate fully in public life,” says Paige Hall Smith, professor of public health education and director of UNCG’s Center for Women’s Health and Wellness. “Being able to feed your child the way you want is part of that.”

Dr. Smith is a trailblazer in scholarly activity concerning the sociocultural, economic, health, and political contexts that influence women’s ability to breastfeed. For 12 years she has organized the Breastfeeding and Feminism International Conference, or BFIC. It’s one of the main breastfeeding conferences in the United States, and the only one focused around social justice, women’s rights, and structural systems that either inhibit or encourage breastfeeding.

This year, the fourth volume of essays from conference participants, “Breastfeeding, Social Justice, and Equity,” was published by Praeclarus Press. Smith edited the volume with Dr. Miriam Labbok, then director of the Carolina Global Breastfeeding Institute at UNC Chapel Hill and BFIC co-organizer, and UNCG doctoral student Brittany Chambers.

Essay topics are diverse and far-reaching, including discussions of emergency global situations where breastfeeding support determines the survival of infants, and conversations about chronically vulnerable populations in the United States.

“There’s still a lot of disparity in breastfeeding by race, by social class, by education, by income across communities,” says Smith.

“Women who are able to control their life, their space, and their time are much more likely to breastfeed and breastfeed for longer.”

Much of the research in the book focuses on the workplace and structural changes necessary to support breastfeeding. Smith and her colleagues have found that most contemporary work environments, both in the U.S. and globally, are not prepared to fully support breastfeeding.

“We continue to have gender expectations and norms that reinforce women as the primary caregivers of children and men as the main economic providers. And we create social structures to buttress these gender roles,” Smith says.

“Bringing babies and breastfeeding into the workplace is a real challenge to our expectations for motherhood and for employees. It challenges both the way we believe work and family should be separated, and what we believe men and women should be doing.”

Since its first incarnation in 2005, the conference has grown significantly. Participants, who have come from 30 countries, include top researchers, country makers, health care workers, and parent support program advocates. Through a scholarship program, conference organizers bring in voices that might not otherwise be heard, including some of the international participants.

Today, Smith says, as more people become aware of the concerns of breastfeeding families, there is growing support for breastfeeding in health care, in communities, in emergency situations, and in workplaces.

“There’s more and more discussion around breastfeeding and social justice,” Smith observes. “And I think we’ve been instrumental in helping to shape the conversation at the national and global level.”

By Susan Kirby-Smith  • Photography by Mike Dickens  Learn more at https://hhs.uncg.edu/wordpress/cwhw

“We’re identifying the social and economic inequities that affect infant feeding practices and experiences,” says Smith. “And we’re developing strategies to respond to them.”
Derek Krueger, professor of religious studies, often shakes up his class on Christianity in Byzantium with this view: “The Bible doesn’t come down from heaven pristine and fixed,” he says. “It doesn’t come down from heaven pristine and fixed.”

Instead, he tells his students that the Bible is a work in progress, shaped by the people who use it and the communities they live in. It’s a story that evolves over time,Krueger explains. “The more learned an author expected his audience to be, the more he felt he could challenge his audience.”


For the past 25 years, Dr. Krueger’s scholarship on Christian culture in the Eastern Mediterranean in the Middle Ages has enriched — and at times veered from — traditional Western views of the religion. In his latest contribution, “The New Testament in Byzantium,” he has co-edited a book that is now receiving attention from scholars doing this type of spade work,” he says. “We’re looking at the contributions, the findings, the new voices, the new methodologies.”

The book, which includes a foreword by historian Michael Holmes and a preface by Dumbarton Oaks fellow Anna Maria Tremko, is the recipient of prestigious fellowships from the Institute for Advanced Study, the Israel Institute for Advanced Study, and the European Institute for Advanced Study.

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AREAS OF DISTINCTION

As we celebrate our 125th anniversary, UNCG also looks to the future with the establishment of a Millennial Campus along Tate Street and West Gate City Boulevard. The two Millennial Campus districts — one focused on health and wellness, the other on visual and performing arts — will partner with private-sector entities to fuel economic growth, innovation, and job creation, transforming our university and the city beyond. https://newsandfeatures.uncg.edu/grant-steps-millenial-campus