SUMMER 2018

momentum

UNIVERSITY OF MARYLAND
COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

HEALTH LATITUDES

Charting A Course Towards Healthier Living Systems

DEAN BEYROUTY'S MESSAGE

I'm pleased to welcome you into the next edition of *Momentum* magazine, which has been thoroughly rebranded and revamped to reflect an exciting period of progressive change within the college. This issue marks the beginning of our beloved magazine's 16th year, and we felt this was an appropriate time to give it a new image. Just as faculty and staff are finding new and innovative ways to foster initiatives and programming across our five initiative areas, the communications team has completed a period of intense research to reimagine the magazine's design, storytelling, and its overall fun factor.

Inside, you'll find a heavier focus on shorter, bite-sized pieces vs. an emphasis on longer form feature articles. We've reorganized almost all sections, added a recurring Q&A with Adel Shirmohammadi called *Ask Adel*, and offer a deeper dive into the minds and successes of our students and alumni. Our two features are themed around our new *One Health* initiative, or as we officially phrase it, *Improve Human, Animal, and Environmental Health*. Moving forward, we're renewing our commitment to exploring the interconnection between these three living systems, and bringing together multiple disciplines across our college to achieve optimal health outcomes for each. All forthcoming issues will be loosely framed around a different initiative area, with the goal of capturing fine work and accomplishments from students, faculty, staff, and alumni.

We highly value feedback, so please feel empowered to share your thoughts with our communications director at binderg@umd.edu. This is your magazine, and we want to hear from you!

With that, I wish you a restful, prosperous summer and look forward to reconnecting with you in the fall. Enjoy the magazine!

Craig Beyrouty
Dean and Director

Momentum is published by the College of Agriculture and Natural Resources at the University of Maryland, College Park, for alumni, friends, faculty, and staff. Comments and alumni notes are welcome and should be addressed to Graham Binder at binderg@umd.edu.

For information on how to engage with the AGNR alumni chapter, please contact Amanda Brown Clougherty at akbrown@umd.edu.

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Contents

FEATURES

OLD DISEASE
NEW POSSIBILITIES

Ask Adel

DR. SHIRMOHAMMADI EXPLAINS THE OF CONCEPT ONE HEALTH

The editorial team of *Momentum* is pleased to introduce a recurring Q&A with Professor Adel Shirmohammadi, who possesses an incredible wealth of knowledge as a long-time research scientist within the college. Within future issues, we'll be seeking input from Adel on major trends, themes, and buzzwords within the realm of agricultural and natural resources.

Can you briefly explain the concept of One Health?

The concept of One Health may be described slightly differently by different disciplines, but the overarching concept is the interactive and integrated relationship between animal, human, and environmental health. It is expected that multiple disciplines work together locally, nationally, and internationally to achieve desired One Health outcomes. The Centers for Disease Control and Prevention (CDC) has recognized that human health is connected to the health of animals and the environment; thus, looking at the whole spectrum through a systems approach is necessary for optimal outcomes.

What is the theory behind this movement?

Proponents of the One Health concept believe that 6 out of 10 infectious diseases in humans are spread through animals. Similarly, environmental disorders from air, water, and soil pollution cause ecosystem illness and affect the living organisms negatively at all levels. Natural resources such as soil, water, and air support the survival of the biosphere; thus, the health of living systems and natural resources is interactively connected (Fig. 1). Understanding connections and implementation strategies to nurture living systems and their ecosystems will lead to healthy people, healthy food, healthy animals, and healthy environments.

What is the goal of the One Health initiative?

The concept encourages multiple disciplines to collaborate in order to achieve optimum health outcomes for people, animals, and the environment. This can only be realized if we recognize the interconnectivity between biosystem components: physical (soil, water, air) and biological (humans and animals at all bio-scales). The vision is "to improve the lives of all species through the integration of human medicine, veterinary medicine, and environmental sciences."

How is AGNR incorporating the movement in its teaching and research?

AGNR's Strategic Initiatives document states, "The college is unique in that we work at multiple scales from organism to field to watershed, and with multiple audiences; including agriculture and urban communities, homeowners, youth and the underprivileged." Indeed, AGNR carries the Land Grant mission forward by educating the next generation of agricultural and natural resource professionals and conducting research at the interface of animal, plant, and human health. Furthermore, AGNR disseminates research outcomes to the general public and stakeholders to help improve their health, as well as their economic vitality. In AGNR, we use interdisciplinary research, extension, and teaching approaches to address ecosystem health, water and food safety, nutrition and health, food insecurity, and animal-human vector infectious disease and prevention techniques. We focus on interactive relationships between food production systems (animal and plant) and ecosystem health including living systems (humans and animals).

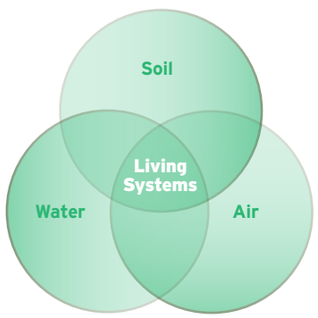


Fig. 1

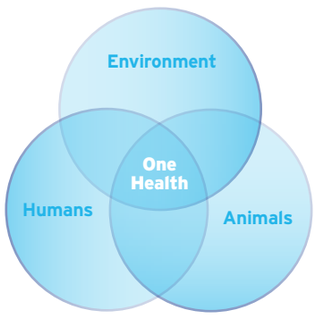


Fig. 2

Healthy living systems are connected to the One Health concept.

ALUMNI JAMIE TAYLOR believes in the value of an agriculture-related degree. Take a glance at her list of professional accomplishments since receiving a bachelor's of plant science in 2007, and you'll notice a steady commitment to the industry with the addition of a master's degree in agricultural education, and two subsequent jobs out of college as a crop scout with Trap Woods, Inc. and a loan officer with MidAtlantic Farm Credit.

A Blooming Business

AGNR GRAD AND "MOMPRENEUR"

Jamie put her chips on the table and opened her own business in 2017. **J Starr's Flower Barn** in Preston, Md., specializes in wedding and event floral design. She handles her own marketing, bookkeeping, social media outreach, product ordering, and scheduling. Jamie is also deeply involved in her husband's family farm operation, and is raising two young daughters, ages two and four. She likes to call herself a "mompreneur." Free time for her is scarce these days, but she's thrilled to be doing something that gives brides such genuine happiness. "So many times it is the bouquet that starts their happy tears flowing, and they say that something about their bouquet just makes it all sink in that they are really getting married!"

There is also an intrinsic connection between her work and her degree from the College of Agriculture and Natural Resources. As a florist, she regularly draws on her plant sciences education, even finding the bandwidth in her busy schedule to grow some of her own flowers. Even though she did not become an ag teacher per the original plan, she recently brokered a partnership with Layton's Chance Winery to offer floral design classes. She offers a spring bouquet class and a wreath class during the winter holiday season which helps fulfill her educational aspirations.

Just when we thought Jamie couldn't be any more ambitious, she offered this glimpse of what's on her horizon.

"I'm really looking forward to being part of a great team of floral designers that will be creating amazing floral pieces for the 106th Annual First Lady's Luncheon this spring! In conjunction with American Grown Flowers organization, Kelly Shores of Petals by the Shore, and Mary Kate Kinnane of The Local Bouquet, they have put together a team of designers to execute their vision for the event. I am so honored to have been chosen to be a member of their team and get to work on such a prestigious event!"

"I believe in the power of youth and agriculture; I also believe people have the right to eat."

ANNA GLENN

A New Wave of AGNR "Agri-preneurs"

MAKING A WORLD OF DIFFERENCE

NATHAN AND ANNA GLENN both grew up on small family farms in Baltimore and Howard counties, participating in their county 4-H clubs. As graduates of the University of Maryland College of Agriculture and Natural Resources (AGNR), their passion has now led them to West Africa, where they have reconnected with their alma mater in pursuit of a common goal—creating sustainable farms to improve the lives of those working as agri-preneurs.

For the Glenns, working in international agriculture was always part of the plan. Taking an opportunity with AgriCorps, a NGO organization, the newlyweds headed to West Africa as agricultural educators at the Booker Washington Institute, a high school boarding school in Kakata, Liberia.

"I believe in the power of youth and agriculture," Anna said, adding that teaching young Liberians to be agricultural entrepreneurs will help them with economic stability in a country with high unemployment. "I also believe people have the right to eat." Liberia imports more than 70 percent of its food. The Ebola virus outbreak in 2014 severely crippled the country, now one of the least developed, low-income, food deficient countries in the world, according to the World Food Programme.

In 2016, the Glenns were one of the first volunteers from **AgriCorps** to work in Liberia after the Ebola crisis, Anna said. The two helped students think critically about the agricultural industry and empowered them to come up with solutions.

"I've learned the importance of working together and focusing on people and not necessarily the task at hand. The task takes care of itself," Nathan said.

Serving two years at the Booker Institute, the Glenns next connected with Hope in the Harvest and the **Liberia International Christian College** (LICC) in Ganta, Liberia. Before starting their next mission, the two traveled home to Maryland for the summer and met up with current AGNR student **Cedric Nwafor,** who had a progressive idea and a passion to back it up (see pages 8 and 9).

Nwafor had just launched **ROOTS**, a student-led organization with a goal of combating hunger and poverty in Africa through education and innovation. It is built as a partnership between local communities, farming operations and colleges in Africa, and University of Maryland students and sponsors in the U.S.

"We were impressed with the ROOTS vision. It was an awesome opportunity for our students to connect with an international organization and share ideas. It is exciting to see their brains all challenged and stretched about complex issues," Anna said. The students connected via social media and video conferencing starting in November 2017.

In March, they met face-to-face. After raising about $20,000 to make the trip and collecting 40 agriculture textbooks for the LICC library, six ROOTS members traveled with Dave Myers, University of Maryland Extension Agent in Anne Arundel County and ROOTS faculty advisor. There they conducted workshops on soil health, crop rotation, plant disease, pest management, and record keeping in the nearby villages of Gbedin, Kpein, and Flumpa. They hosted a seminar on women's health and food safety, and an agriculture business development workshop for about 140 Nimba County community members. The Glenns said it was an excellent outreach effort for LICC as well.

"It is all part of making farming a career option they want to go into. In these countries, you can make a good living and feed the world of course," Myers said. The ROOTS partnership also empowered students from diverse backgrounds to seek out new opportunities for friendship and cultural understanding.

"I was proud of each and every single student from both universities, and I am so honored to be part of this unique pilot program connecting students around the world who have similar passions for improving our world and working toward improved food security and health for all," Anna wrote in a blog about the ROOTS partnership.

For Nathan, the partnership was a reminder that critical thinking is essential for the future of agriculture. "My hope is that the LICC and the agriculture department here are left stronger and more equipped to move forward and produce graduates who are the future thinkers and leaders in Liberia's agriculture industry," he said. "For me personally, my perspective of the world changed. I know more about another part of the world. How they live, how they eat, how they breathe."

Anna, Cedric, and Dave Meyers with their ROOTS colleagues and students in Ganta, Liberia.

Hungry for Change

> "In my mind, to combat the ills in Africa, we need to address hunger and poverty, and we can do it through agriculture."
>
> CEDRIC NWAFOR

GROWING UP IN A SMALL VILLAGE IN CAMEROON, Central Africa, Nebafabs Cedric Nwafor planted and harvested beans, yams, and legumes by hand. He clearly remembers walking across acres of fields, carrying heavy bags, hungry and thirsty, and wondering how he could help make a change for his family and his village.

It is that same thirst for change that was the inspiration behind a program he developed as an Agricultural and Resource Economics student at the University of Maryland College of Agriculture and Natural Resources (AGNR) to improve the lives of those he left behind in villages like his own. Lofty goals? Perhaps. But, Nwafor believes that through respect, innovation, and education, he can not only help make farmers more productive, but that productivity can lead to greater financial independence and even a change in the mindset of those who wield power in African countries.

Nwafor was raised with his older brother and sister by a strong-willed single mom, Marie Chantal Djuissi. She worked alongside her son in those fields to put food on the table. But, she said it was a happy home where they worked to survive surrounded by others doing the same.

Nwafor left the village to live at a secondary boarding school from age 15 to 20—a place he said, that felt like a prison.

"Living in Cameroon in a boarding school, the hunger was horrible. If you cannot guarantee your next meal, you hoard your food, you become an adult, and become corrupt when you have power because that is the survival mindset," Nwafor explained as he headed on a trip to Ghana for an agricultural conference on entrepreneurship and sustainability.

At 21, Nwafor joined his mother in the United States who had come seven years earlier through political asylum. He was struck by the opportunity and resources. He immediately became an entrepreneur.

"In my mind, to combat the ills in Africa, we need to address hunger and poverty, and we can do it through agriculture," Nwafor said.

In 2015, Nwafor took his concept to Professor Larisa Cioaca's Agricultural Entrepreneurship class, one of about a dozen courses in AGNR focused on innovation and entrepreneurship. After a few iterations, his model became one of connecting students at the University of Maryland with farmers and agricultural students in Ganta, West Africa where University of Maryland alumni **Anna and Nathan Glenn** were working at the Liberia International Christian College (LICC).

Cedric made fast friends with students at the primary school in Flumpa, Liberia.

Nwafor's idea resonated with Cioaca, herself an immigrant from Romania. She worked with Nwafor and the handful of students who signed on to his program, **ROOTS**, to help them understand teaching entrepreneurship to students in another country will require cultural sensitivity and exchange. She helped him discover he needed a grant-writing and fundraising component to survive.

The ROOTS program launched in September 2017 and began connecting weekly with eight students enrolled in LICC's global agriculture class learning about trends, challenges, and opportunities in the field. The students worked together to address agricultural issues of sustainability and markets. AGNR students conducted a book drive, arranged an agricultural expo, helped provide needed equipment, and directed entrepreneurship training.

"We see trips where they come abroad and do something for the people instead of partnering with them with dignity. This is about both groups sharing ideas," Anna Glenn said from her home on the LICC campus. To Nwafor, dignity is the main driver.

"We are not going in as saviors or experts. We are learning together to address challenges and trade ideas," he said.

In March, ROOTS students traveled to Liberia where they hosted a conference attended by 140 people, mostly farmers focused on business modeling and record keeping. Workshops in nearby villages used generators to facilitate presentations on soil testing, pest management, and agribusiness.

Cedric leading a ROOTS workshop in Ganta, Liberia.

For Nwafor, ROOTS is something he wants to carry on at the University of Maryland, and he hopes it can be a model to be used in other countries. His immediate goal is expanding to schools in Uganda and Rwanda. As a May graduate, he plans to leave his job as a concierge at the Ritz Carlton in Georgetown to use his degree, perhaps working for USAID. He said he wants more hands-on farming experience.

"What happened in my past made me who I am. It formed me. No one should have to suffer with hunger like that, but the question is how to utilize your experiences so that others don't have to go through it. It was my privilege to live the life I lived," Nwafor said.

A National Win for International Nutrition

AGNR STUDENT CAPTURES NATIONAL STUDENT POSTER AWARD

Adeoye's desire to address global hunger started when she took a course in international nutrition her junior year. "I became interested in research out in the community, out with people and not in a lab." In her project with the South Asian population, "we were able to educate them and inform them what could be done so they could think of health in a different way...It was also nice to see how the data relates [to solving the problem]."

ADEOLA ADEOYE took her passion for better global nutrition and turned it into a poster that recently won first place in a national contest sponsored by Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS) based in Atlanta.

The poster, "Body Fatness Measures for Local South Asians in Relation to National Cutoffs Used for Disease Intervention: A Pilot Study," represented months gathering data, including patient interviews at a Silver Spring clinic. Adeoye, who majored in nutrition and food science with a minor in sustainability and global poverty, graduated from the University of Maryland this spring.

"I was very surprised," Adeoye said of winning top honors at the MANRRS gathering, learning earlier that her initial abstract of the poster was among 10 finalists. At the convention she stood on stage, assuming the order in which they were lined up meant, "Oh, I guess I'm third," only to be shocked with top place. In the comments from the judges, "one of them said they liked my enthusiasm for the project," she recalled.

Adeoye, who was born in Nigeria and moved to the United States when she was seven, resides in Frederick, Md. She plans to take a year before starting graduate school to participate in a fellowship in Roanoke, Va, working in community outreach through a local church. Her ideal job after grad school is one that "allows me to work with developing countries to find ways [of improving nutrition] so they are not relying on outside sources. I want to empower them to develop programs where they would be self-sustaining."

During her time at the University of Maryland, Adeoye was vice president for academic affairs in the Office of Multi-Ethnic Student Education Academic Excellence Society and was a peer mentor and student ambassador for the College of Agriculture and Natural Resources. She was also a university honors student and Banneker/Key Scholar due to demonstrated academic leadership and accomplishment.

Turning Trash to Treasure

THE SECOND ANNUAL UNDERGRADUATE IDEATION COMPETITION WINNERS

JOE GARNER, MIRIAM TASKER, AND CASEY MOORE have a fearless idea with a playful name. Collectively, they have developed a business concept and physical product they call **Fergie**, which, amazingly, came to fruition in only one semester's timeframe. Fergie is a fertilizer composed of algae—hence the name, a combo of the two words.

Rewind to November 1, 2017, the hard deadline to receive team submissions for the college's second annual **Agriculture Innovation to Commercialization (AgI2C) Undergraduate Ideation Competition**. When the posters announcing the competition were put up in September, Garner, Tasker and Moore put their heads together and began developing an idea for a viable entry to submit in November. Not only was the idea viable, it had all the necessary criteria for victory.

Business ideas for the competition were to address problems or opportunities in any area of agriculture, natural resources, and environmental sustainability, such as the Chesapeake Bay, air quality, healthy food systems, or sustainable agricultural production, just to name a few. This is part of our college's effort to foster innovative and entrepreneurial thinking across its growing student body.

The Fergie team submitted their product. The algae used in Fergie are harvested with a sustainable eco-technology, popularly known as an Algal Turf Scrubber (ATS). There are ATSs located all across the mighty expanse of Maryland's

"The competition is filled with brilliant like-minded peers and wise leaders that are willing to help you pursue your idea to its fullest."

CASEY MOORE

Dean Beyrouty, Miriam Tasker, Casey Moore, Joe Garner, and Dan Kugler celebrate the win at the competition.

beloved Chesapeake Bay. They are designed to remove excess amounts of algae that manifest in water.

"After removing the algae from our waters, we have a waste byproduct: lots of algae! We found that these algae can be mixed into soil and used as a fertilizer," said Moore. "We also discovered that our product works equally as well as synthetic commercial fertilizers. We have found a way to turn trash into treasure and pollution into profit."

Fast forward to February 27, 2018. Fergie is pitted against stiff competition in the final round of the Ideation event, and is unanimously selected as the victor through a rigorous judging process. At this point, the Fergie team is still in the initial phases of commercialization. They plan to get their product to local businesses in the College Park region in 2018. They are currently networking with other startups, and educating themselves about the business and entrepreneurship world.

When asked to offer advice for budding entrepreneurs that may enter next year's competition or are looking to launch a business, Moore offered this wisdom: "Say 'Yes!' Go for it! If the worst thing that can happen is failure, then congratulations on walking across one of the many stepping stones on the path to your dreams! Also, make sure to have fun. The competition is filled with brilliant like-minded peers, and wise leaders that are willing to help you pursue your idea to its fullest."

> "We have found a way to turn trash into treasure and pollution into profit."
>
> CASEY MOORE

Algae removed from the ATS is mixed with soil to create Fergie.

A PORT OF SUSTAINABILITY

A NEW KIND OF HARVEST

BY SAMANTHA WATTERS

THE PORT OF BALTIMORE is a massive transport and economic center for the mid-Atlantic region, ranking ninth nationally for total cargo value. But with all business comes natural resource use and consequence.

Through its Green Port initiatives, the Maryland Department of Transportation Port Administration (MDOT MPA) is actively trying to reduce pollution in the Chesapeake Bay and discover new ways to increase the overall sustainability of the Port. The College of Agriculture and Natural Resources is partnering with the MPA and the Maritime Administration (MARAD) of the U.S. Department of Transportation to pilot innovative, sustainable technology with the goal of cleaning up the Port of Baltimore for a healthier Port and Bay.

Dr. Stephanie Lansing, Associate Professor in the Department of Environmental Science and Technology, is leading a pilot project to explore ways to achieve this goal. "What I love about this project is that we are taking traditional agricultural practices and water quality work and applying it to an urban setting in a unique way that hasn't really been done before," she said.

DR. STEPHANIE LANSING AT THE PORT OF BALTIMORE

"We are cleaning up the Bay, improving water and air quality, reducing pollution, and creating renewable energy using innovative green technologies for the Port all at once."

The process starts with a system called an **algal turf scrubber,** a unique system that has been perfected over the years and built for the Port by Dr. Patrick Kangas and Dr. Peter May, also of the Department of Environmental Science and Technology. Kangas and May built a treatment system using algae as the filter, resulting in excess nutrients being removed from the water. Nutrient pollution causes the water to be low in oxygen, killing the wildlife and throwing off the natural ecosystem. This project not only combats this issue, but Lansing is using the algae produced from the treatment process as a sustainable energy source. Growing algae as a filtration system is fast and efficient. Water from the Patapsco River next to the Port is fed into a runway that is 200 feet long and six feet wide. The runway consists of a plastic sheeting material covered in a screen and is used to grow algae, pulling out the nitrates and phosphates from the water for its natural growth processes. The water that is cycled back into the river is therefore cleared of nutrient runoff that can cause imbalances and issues in the Bay. Instead, what is returned is oxygen rich, clean water, improving water and air quality around the Port.

DR. PATRICK KANGAS AND DR. PETER MAY WORKING AT AN ALGAL TURF SCRUBBER

"IN ORDER TO REACH 20 PERCENT RENEWABLE ENERGY SOURCES BY 2020, WE KNOW WE NEED A LOT OF DIFFERENT TECHNOLOGIES AND RESOURCES TO GET THERE. OUR PARTNERSHIP WITH THE UNIVERSITY OF MARYLAND HAS BEEN A HUGE HELP AND VERY REWARDING."

BARBARA MCMAHON
MARYLAND DEPARTMENT OF TRANSPORTATION PORT ADMINISTRATION

Algal turf scrubbers are valuable, but the question of what to do with all this algae remains. Algae grows quickly and are ready for harvest once a week. This means you have a consistent supply of biomaterial that can be used for compost or as a resource in and of itself. This is where Lansing's work comes in, with designed biomaterial digestion systems for agricultural use and energy production. Following the weekly harvest, the algae is fed into a series of three digesters designed and built by Lansing, housed in small greenhouse-like structures that break down the algae to produce methane-enriched biogas. The biogas can be used as a supplement to power a fuel cell that produces electricity.

"We are harvesting very high quality methane gas from the algae so far to power our fuel cell. From manure, we are used to seeing 55% or 60% methane, but we are seeing 75% methane or higher from the algae, making it very efficient," explained Lansing. "Because the algae grows so quickly and is easy to harvest, it makes a great consistent source of biogas when fed into the digesters."

Currently, the fuel cell is only being used to power flood lights around the digesters. The goal is that the water pump can be powered by the biogas as well, making this a completely sustainable and closed system for this small-scale pilot project.

"If we can show that this is economically feasible and determine how much space we need to clean how much water and produce how much electricity, we can hopefully scale this up from a pilot project and create something viable that we can use to improve the sustainability and environmental footprint of the Port," said Barbara McMahon of the MPA. "In order to reach 20 percent renewable energy sources by 2020, we know we need a lot of different technologies and resources to get there. Our partnership with the University of Maryland has been a huge help and very rewarding."

THE PORT OF BALTIMORE IS A MASSIVE TRANSPORT AND ECONOMIC CENTER FOR MARYLAND AND THE MID-ATLANTIC REGION, RANKING NINTH NATIONALLY FOR TOTAL CARGO VALUE.

OLD DISEASE new possibilities

By Ellen Ternes and Samantha Watters

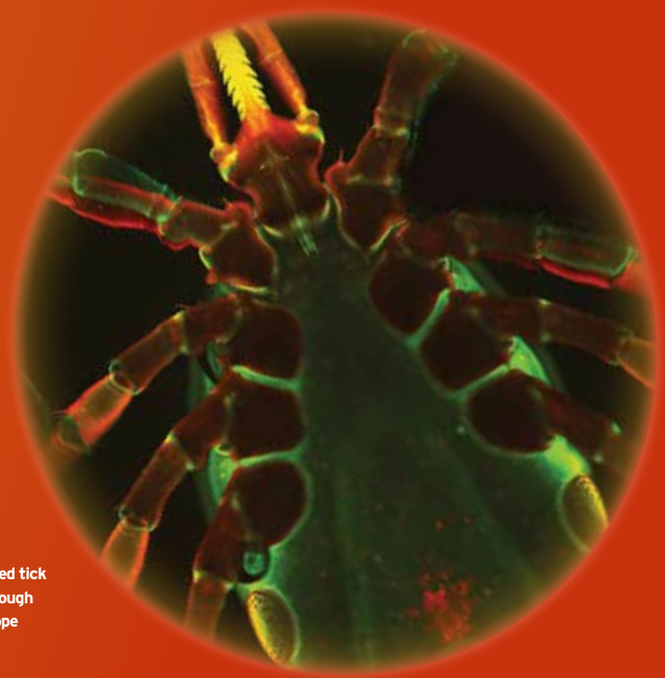
Dr. Utpal Pal, Professor in Veterinary Medicine

In 2016, Maryland ranked **sixth nationally** in confirmed cases of Lyme disease.

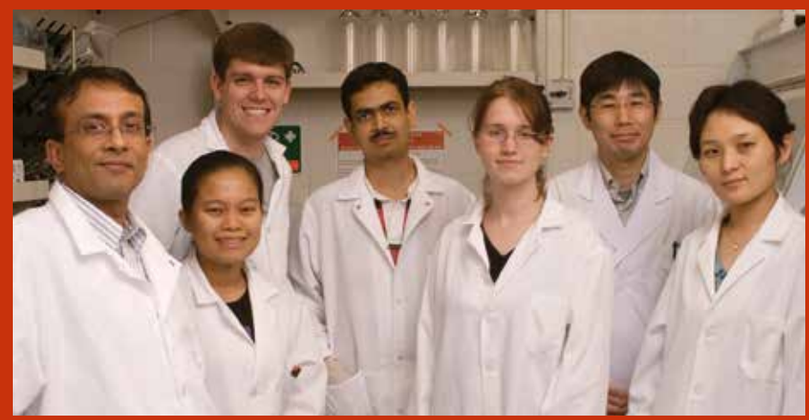
LYME DISEASE, an infection spread to humans by bites from ticks, was relatively unheard of as recently as the 1980s. Even its name, after Lyme, Conn. where the first U.S. case was diagnosed in 1975, is recent. But, says **Dr. Utpal Pal**, professor in Veterinary Medicine studying Lyme disease for the past two decades, "It's a very, very old disease." The bacteria that causes Lyme, *Borrelia burgdorferi*, was found in the 2012 discovery of the 5,300-year-old Copper age remains of "The Iceman," and again in 2014, in a tick that dates back 20 million years.

Today, the Centers for Disease Control and Prevention (CDC) estimates that more than 300,000 people in the U.S. contract the disease each year. In 2016, Maryland ranked sixth nationally in confirmed cases. The federal government recently declared Lyme disease and other tick-borne diseases a major public health issue, accelerating medical product development to address tick-borne disease as part of the 21st Century Cures Act. A One Health approach that explores links between human and animal disease will be critical in that effort.

For Pal, who serves on a Tick-Borne Disease Working Group Subcommittee for the U.S. Department of Health and Human Services, and his research team, the One Health approach has already led to breakthrough discoveries about the bacteria that could lead to better treatment, and even prevention, of Lyme disease.



Black-legged tick viewed through a microscope



Dr. Uptal and members of the research group in the lab

the disease

Lyme disease symptoms can include fever, headache, fatigue, and skin rash. If not treated soon after infection, the pathogen can move into joints and organs, even the heart and nervous system, creating long-term inflammatory problems. It's important to start antibiotic therapy as soon as possible after being bitten, but therein lies the rub. The black-legged ticks that Pal studies and that carry the bacteria are so small, it and its seemingly painless bite may easily go unnoticed. The rash that might appear shortly after infection is a good warning, Pal says, but around 30 percent of Lyme-infected people don't get that rash.

By the time other symptoms appear, the bacteria have already taken hold, making it harder for antibiotics to do their work. While the body's immune system kicks in to fight established bacteria, it's that very attack that causes painful inflammation.

"Most people don't realize that they actually are walking around with more bacterial cells in their bodies than their own cells, so we are really bags of bacteria," explains Pal. "Most are good, but the second your body detects something that is a pathogen and can cause disease, your immune system starts to work." The body sends a first, nonspecific wave of attack to kill the *B. burgdorferi* detected that doesn't belong. This happens within a few hours to days. If this doesn't work, it takes seven to ten days to learn about the enemy and send a large second wave of reinforcements to kill what is left.

"Lyme disease is actually caused by your immune system," explains Pal. "This bacteria wins the first battle, and your body overreacts so much that it causes intense inflammation in all the joints and areas that the bacteria spreads by sending so many reinforcements to kill it. *Borrelia* is then killed, but the inflammation remains and causes many of your symptoms for Lyme disease. That is why killing *Borrelia* in the first wave of immunity is so important."

the discovery

Dr. Pal's research group zeroed in on those first critical hours after a tick deposits the bacteria and isolated a protein produced by *Borrelia* that disables one of the body's first immune responses, giving insight into mechanisms that are largely not understood.

To find out how *B. burgdorferi* does its damage in mammals, Dr. Pal's lab studies mice that have been infected by ticks carrying the pathogen. The team created a mutant bacteria by removing a protein that shows up only in *Borrelia* and that had a good probability of being one of the bacteria's frontline henchmen that helps it survive the host's innate immune response. They then infected mice with both forms of *Borrelia*—the wild, still containing the *BBA57* protein, and the mutant.

To the team's excitement, the mutant showed almost a complete absence in the mice after the first round. It appeared they had found the protein critical to defeating the host's immunity. But a week later, mutant *Borrelia* was showing up in same or greater strength as the wild type bacteria.

In a recent paper in *The Proceedings of the National Academies of Science*, Pal reported his discovery along with the surprising never-before-seen phenomena. His team found that even without this protein and with the immune system responding perfectly, the bacteria can spring back in the body weeks later. "This means there is a second line of defense for *Borrelia* just like for our body's immune system. This had never been observed before," said Pal. This finding is all the more interesting given recent disease trends. There are a growing number of cases of Post-Treatment Lyme Disease Syndrome (PTLDS), where symptoms return after routine treatment, but no longer respond to antibiotics. "The exact cause of PTLDS remains unknown and controversial," says Pal. "This discovery gives us insight into what could be causing these chronic Lyme disease cases."

To the team's excitement, the mutant showed almost **a complete absence** in the mice after the first round.

One tube contains the wild bacteria, the other contains the mutant bacteria Dr. Pal's team created.

Pal continues to study the bacteria that causes Lyme and the ticks that spread it, with the knowledge that the problem is more widespread than data show. "The symptoms of these diseases present similarly to many other illnesses and are hard to pin down, so they are vastly underreported and an even bigger public health concern locally and globally than people realize," says Pal.

Adult black-legged ticks, at only 1/8 inch, may easily go unoticed.

Faculty & Staff Recognitions

Lori Lynch

APPOINTED AS AREC DEPARTMENT CHAIR

The college is pleased to welcome Dr. Lori Lynch into her new role as department chair for Agricultural & Resource Economics (AREC). Lori has been with the college for 22 years, and has proven her commitment to excellence and passion in all aspects of her work. Lori received her doctorate from the University of California, Berkeley before joining the college as an assistant professor. For the past 10 years, she has been working as a professor and Extension economist for AREC.

Lori has represented the department, college, and university as a visiting and senior economist with the Conservation and Environment Branch of the Economic Research Service within USDA, including service as branch chief. She frequently gives talks and presentations, authors book chapters and important academic papers, and serves on panels and advisory committees as a leader in her field. In addition, she has been an integral member of the college's strategic visioning team, providing valuable input for the future of the college. The college looks forward to her leadership and her continued work as a mentor to students, faculty, and staff.

Lisa Lachenmayr

HONORED WITH UMD'S PROVOST EXCELLENCE AWARD

The college congratulates Lisa Lachenmayr as one of eight recipients of the Provost's Excellence Award for Professional Track Faculty. Established in the fall of 2015 to honor the contributions of professional track faculty on campus, winners receive a letter of recognition from Provost Mary Ann Rankin, and a $1,000 award in celebration of consistently excellent contributions in one of the three core areas of academic activity: teaching, research, and service.

Lisa is the program director for Extension's Food Supplement Nutrition Program (FSNE). Due to Lisa's leadership and motivation, since 2010, FSNE has secured over $44 million in funding to assist youth and families in all counties and Baltimore City.

In 2017 alone, FSNE reached more than 34,340 low-income participants through direct nutrition education sessions, resulting in a total of 243,581 contacts. Also, over 2,000 teachers were trained to lead FSNE lessons during regular class time. Programs were implemented in all Maryland counties and Baltimore City, and were delivered by more than 70 faculty who serve residents in the counties where they work. Lisa's vision and strategy has been integral in achieving these outstanding results.

Frank Allnutt

CELEBRATES 40 YEARS WITH THE COLLEGE

As is the tradition of the college's annual faculty and staff awards, Dean Beyrouty recognizes various stages of dedicated service, starting with five years. Many were recognized in celebration of an impressive 5, 10, 15, and even 25 years of employment, but only one with a staggering 40 years of AGNR stories in his memory bank.

Frank Allnutt has dedicated his life to the college, starting with his undergraduate education. He received his bachelor of science in agronomy-crops in 1977, and following graduation began his career as an agricultural technician responsible for the maintenance and repair of farm equipment. Throughout the 80s and 90s, Frank operated as farm manager for the Western Maryland Research & Education Center, and in January 2000 was entrusted with the responsibility of Center Director for the Central Maryland, Lower Eastern Shore, and Western Maryland Research & Education Centers. He expertly manages the critical role of making sure the seven facilities that comprise the three centers are in top form to support the basic and applied research conducted by college faculty and cooperating agencies.

Frank is intensely devoted to the land-grant mission of the college and university and is an excellent ambassador for its services and programs. His reputation as an effective supervisor and mentor is widespread throughout the college. Possessing an impeccable work ethic and a can-do attitude, Frank is consistently sought out as a partner on multiple research and outreach endeavors. Please join us in congratulating Frank on his 40 years of service to the College of Agriculture and Natural Resources.

Dr. Darren Jarboe

AGNR / UME'S NEW ASSISTANT DIRECTOR AND PROGRAM LEADER OF AGRICULTURE

The college and University of Maryland Extension welcomes Dr. Darren Jarboe into his new role as Assistant Director and Program Leader for Agriculture. Darren leads a team of 34 Extension professionals who conduct applied research, and develop and deliver science-based educational programs for Maryland agriculture. Darren joins the college from Iowa State University where he focused on aligning industry and faculty research objectives to commercialize technologies in the food, feed, and biorenewables sectors. His expertise includes biorenewables, agricultural seed and machinery, technology commercialization, and entrepreneurship. He is co-founder and board member for Gross-Wen Technologies, Inc., a startup company commercializing an algae technology for wastewater treatment. Dr. Jarboe holds B.S. degrees in agronomy and agricultural business, a MS in business administration, and a Ph.D. in industrial and agricultural technology, all from Iowa State University.

AGNR Events & Celebrations

Ag Day/Maryland Day kicked off in College Park with a breakfast, showcasing entrepreneurial and research innovation within the College of Agriculture and Natural Resources. A trio of young entrepreneurs that won the 2018 Undergraduate Ideation Competition shared their Fergie algal fertilizer project. Dr. Galen Dively and Dr. Dilip Venugopal unveiled their recent study demonstrating the lasting benefits of Bt corn, showing benefits to green beans, peppers, and other major crops. Dr. Jennifer Murrow and her graduate team from Environmental Science and Technology shared their plan to reduce and control the black-legged tick population, thus combating Lyme disease. Dean Craig Beyrouty wrapped up the morning's program.

The competition winners presenting their Fergie algal fertilzer project

Dr. Jennifer Morrow presenting with members of her team

Dr. Dilip Venugopal presenting recent research beneficial to major crops

Dean Beyrouty with President Loh

Ag Day 2018

Maryland Day 2018

Thousands turned out for the 20th annual **Maryland Day** and 93rd annual Ag Day on the College Park campus at the University of Maryland on the last Saturday in April. Livestock shows, hands-on educational activities, student demonstrations, exhibits, games, and food filled the day with fun for all.

Livestock shows at the campus farm are always a major draw.

Dr. Juan-Luis Izursa demonstrated his aquaponic research.

Entomology's "Insect Petting Zoo"

Serving up ice cream from the Maryland dairy

20 YEARS

Spring 2018 Commencement

There were 215 undergraduate students from the College of Agriculture and Natural Resources achieving a milestone in their lives on May 19, 2018 at Reckord Armory. They celebrated earning their four-year degrees during commencement ceremonies.

Dr. Chavonda Joacobs-Young, USDA, Acting Chief Scientist; Acting Deputy Under Secretary for Research, Education, and Economics (REE); and Administrator of the Agricultural Research Service (ARS) gave the commencement address.

Cedric Nwafor, BS, Agricultural and Resource Economics, delivered the student commencement address.

Faculty and Staff Awards

The College of Agriculture and Natural Resources **State of the College and Awards and Service Recognition** was held on May 21, 2018 at Riggs Alumni Center. Top honors went to:

Service Awards

DR. DALE JOHNSON
Dean Gordon Cairns Award for Distinguished Creative Work and Teaching in Agriculture

BEN BEALE
University of Maryland Extension Excellence Award

DR. ABANI PRADHAN
Paul R. Poffenberger Excellence in Teaching and Advising Award

DR. PAUL LEISNHAM
Faculty Research Award

DR. JORGE HOLZER
Integrated Research & Extension Excellence Award

DR. MARGARET UDAHOGORA
On-Campus Professional Track Faculty Award

DR. MARK DUBIN
Off-Campus Professional Track Faculty Award

GLENDA CANALES
On-Campus Staff Excellence Award

DR. VIRGINIA BROWN
Off-Campus Junior Faculty Award

DR. KATHERINE TULLY
On-Campus Junior Faculty Award

Service Recognition

40 YEARS
Frank Allnutt

35 YEARS
Janice Barber
Lisa Yoash
Joseph Streett

30 YEARS
Melanie Abbott
Jeffrey Joseph Cunningham
Alfred Hawkins
William Killen
Mary Morrissey
David Muhleman
G.R. Welsh

25 YEARS
Christopher Dowell

Frank Allnutt was unable to attend the event, but his colleagues made sure he was there in triplicate

Dr. Dale Johnson with Associate Dean Adel Shirmohammadi

Ben Beale

Dr. Margaret Udahogora

Dr. Virginia Brown

Farewells

Dr. Bahram Momen

Dr. Bahram Momen, Associate Professor in Environmental Science and Technology, College of Agriculture and Natural Resources, died on March 12, 2018. Coming to the U.S. in 1984, he worked as a professor in ENST since it was formed in 2006. He was described as a 'master instructor' for his ability to help students grasp complex ideas and understand the theories and philosophy of statistics. While his specialty was advanced statistics, Momen was adept in ecology, forest engineering,, and agriculture. He received a doctorate in environmental science and statistics from the University of California, Berkeley and received several awards, including the Paul R. Poffenberger Excellence in Teaching and Advising Award in 2005 and honors from Gamma Sigma Delta, an international honor society of agriculture. Momen is survived by his wife, Shahpar, son, Ali, and daughter, Sara.

Dr. Nickolas G. Zimmermann

Dr. Nickolas G. Zimmermann of Salisbury died September 29, 2017. He was an Associate Professor, Extension Poultry Specialist in the Department of Animal and Avian Sciences. He was dedicated to teaching and working with the poultry farmers and chicken fanciers. He enjoyed educating and mentoring 4-H youth. "Dr. Z" coached the Maryland 4-H Poultry Judging team that won first place at the National 4-H Poultry and Egg Conference in 2014. He was a long-time member the Poultry Science Association, American Poultry Historical Society, and other professional organizations. He joined the University of Maryland in 1994 at the Lower Eastern Shore Research and Extension Center and transferred to College Park in 2002. He is survived by his wife of 41 years, Mary E. Zimmermann and his siblings; Debra Crisp (Kevin Church), Shirley (Clark) Adams, Ronald (Joy) Zimmermann, and Thomas (Ginny) Zimmermann.

David Weitzer

David Weitzer '51, died on December 19, 2017. He was known as a stellar businessman, exceptional farmer, beloved friend, competent mentor, community pioneer, and a family man. His passion was promoting the dairy industry regionally, nationally, and internationally. Weitzer bred and raised Holstein cattle and commodity crops on the Beneva Farms in Poolesville. He served on various boards, including the National Dairy Promotion and Research Board, vice president and director for Maryland and Virginia Milk Producers Cooperative, the Maryland Agricultural Commission and Maryland and Virginia Veterinary College Advisory Committee. In 2012, he received the Montgomery County Agricultural Hall of Fame Award. Weitzer is survived by his wife, Barabara Furst Weitzer; one daughter, Keri Ane Grossnickle and husband Troy of Poolesville; one sister, Sara Janet Shaw of Catonsville; and two grandchildren, Ty and Luke Grossnickle.

William "Bill" Miles Hanna, Jr.

William "Bill" Hanna, Jr., '64, died on March 10, 2018. Upon graduation, he joined the U.S. Air Force where he engaged in counter-intelligence and was honorably discharged in 1967 as an A1C. He returned home to run the family-owned Whiteford Packing Company and was president from 1967 to 1988. In 1988, he shifted his focus to Quigley Farm as a fresh-market vegetable grower of primarily green beans, sweet corn, and asparagus. Hanna served on many boards and associations, including past president and director of the Harford County Farm Bureau, past president and director of the Mid-Atlantic Food Processors Association, Maryland Agricultural Commission, Maryland Vegetable Growers Association and past president and director of the Bel Air Farmers' Market. He is survived by his wife of 46 years, Donna Olson Hanna.

Save the Dates

MARYLAND STATE FAIR
AUGUST 23 - SEPT. 3, 2018

The "Best 11 Days of Summer"—our college will once again have a major presence throughout the Fair with demonstrations and showcases ranging from robotics to crop and livestock production to a live birthing center. The University and the college will host "UMD Day" on August 25. Plan to stop by and visit with Dean Beyrouty and other staff to learn about the impact we're making on the state of Maryland.

GLOBAL CHALLENGES: BUILDING HEALTHY FOOD SYSTEMS
OCTOBER 4, 2018

The college will host a major summit on campus featuring our work and contributions in the areas of food safety and security. We will welcome speakers, presenters and contributors from across the University and other prominent land-grant institutions, featuring a keynote address from Dr. Gebisa Ejeta, the 2009 World Food Prize winner. Per our new strategic initiatives, this AGNR Cornerstone Event will set the precedent for the University's contributions towards feeding a rapidly expanding worldwide population and ensuring equitable access to food for all.

COLLEGE OF AGNR OPEN HOUSE | OCTOBER 6, 2018

See back cover for more information.

Dr. John F. Soper

B.S. BOTANY '81, M.S. AGRONOMY '83, COLONNADE SOCIETY MEMBER SINCE 2004
THE SOPERS SUPPORT STUDENT SCHOLARSHIPS

Dr. John Soper and Ellen Soper

For **Dr. John Soper,** the University of Maryland has long played a key role in his family. His mother received both her bachelor's and master's degrees from UMD's College of Education. His brother and sisters soon followed in their footsteps by attending and joining the UMD alumni ranks.

During his time at Maryland, he was exposed to rewarding career opportunities in agriculture, plant breeding, and genetics. He participated in a collaborative program with the USDA Agricultural Research Center, which fueled his passion for understanding how genetics and environments interact to influence living organisms. This led to him pursing his master's degree in Agronomy and enabling him to attain career advancement beyond what he could have imagined. One of his fondest memories while studying at UMD was being interviewed by *The Diamondback* for having one of the most unique rooms on campus with over 200 houseplants.

As a student, he also understood how difficult it was to make ends meet. He worked 20 hours per week during the school year and all summer to help support himself financially. He believes these financial roadblocks are key factors that inhibit talented individuals from pursuing academic studies and tapping into their full potential.

Dr. Soper cites this as his main reason for giving to student scholarships at UMD, which he has been supporting for over 20 years.

Dr. Soper uses a donor-advised fund for most of his charitable giving. This approach allows him to take advantage of multiple tax benefits and provides greater flexibility on the timing of his charitable donations. To those who are considering donating to the UMD, he suggests focusing on a cause you truly believe in based on your own experience and passion.

COLLEGE OF
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AGNR OPEN HOUSE

OCTOBER 6, 2018

Please join us 10 AM - 3 PM at the Clarksville Central Maryland Research and Education Center to experience the College of Agriculture and Natural Resources' visionary research, impactful Extension programs, and academic programs designed to prepare the next generation of change agents. Our college is at the forefront of solving the most pressing agricultural and environmental challenges to create a more sustainable planet for future generations, and we're thrilled to put it all on display for you. There is something for everyone to see and do, for families of all ages and sizes.

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