

Virginia Scientists

Volume XXVII, Issue 1

Spring 2021

“Virginia Scientists” is the official newsletter of the Virginia Academy of Science (VAS). This publication offers information for VAS members such as upcoming events, past events, scholarships/awards information, accomplishments of VAS members and other timely information.

Editors:

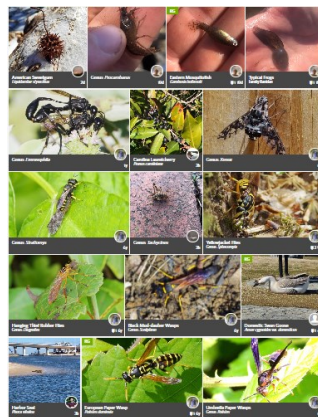
Sujan Henkanathgedara
Deborah Neely-Fisher

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1 Million Observations, 13,500+ Species and Counting!

The inaugural Virginia BioBlitz, organized by the Virginia Academy of Science, launched a new era of biodiversity exploration of the Commonwealth and became one of the largest biodiversity data repositories in Virginia, powered by thousands of citizen scientists. The BioBlitz team, led by Dr. Sujan Henkanathgedara, used the online



citizen science app, iNaturalist (<https://www.inaturalist.org/>) to harness the power of hundreds of citizen scientists from every part of the state to explore, discover and report species. The all-day kickoff event was facilitated by Dr. Henkanathgedara through Zoom and initiated with a welcome by VAS President Michael J. Wolyniak and a keynote speech by Virginia Secretary of Education Atif Qarni.

The team set a goal to record 100,000 observations covering 6,500 species by 5.30pm on September 26, 2020. Guess what! We ended up tallying 111,000+ observations covering 6,600+ species by the end of the day. As of February 2021, the Virginia BioBlitz project records 1 Million observations by more than 36,000 citizen scientists covering 13,517 species, making this database one of the largest biodiversity data repositories in the state.

“As we approach our centennial, we have placed a strong emphasis on developing ways to better act as a source of educational outreach for all citizens of the Commonwealth of Virginia so that nobody is excluded from becoming more informed citizens or becoming a part of the Virginia STEM workforce” said Dr. Wolyniak. Virginia Secretary of Education Atif Qarni added that “Virginia BioBlitz is a great way for children and families to experience hands-on, deeper learning that promotes creativity and critical thinking. Additionally, this is a great tool for educators to get students outside and show them the relevance of STEM in their daily lives”.

Ken-ichi Ueda, co-founder and co-director of iNaturalist, joined the kick-off event from California and shared his story on how he conceived the idea and developed iNaturalist. Additionally, many regional scientists, ...cont'd. P13

President’s Message

As we continue in this most unusual of times, I am grateful to all those who are working to maintain some semblance of normalcy in maintaining the scientific enterprise in Virginia.

We have witnessed a truly remarkable scientific feat in the production of COVID-19 vaccines within a single year that are safe and effective. It is now up to the Academy and like-minded organizations to spread the word about the safety and efficacy of these vaccines, and the Academy has released its first Resolution in a generation in support of this effort. We have also paired up with

Dr. Edward Lewin at Georgetown Medical School to study novel approaches towards providing effective vaccine education to middle school students and their teachers. I am hopeful that this initiative will provide new information that can serve as a model for vaccine not just in Virginia but across the entire nation.

We have witnessed teachers across the Commonwealth come up with innovative ways to keep scientific education up and running at a time in which the status of classrooms can change on a week-to-week basis. The Academy has stepped up ...cont'd. P7



Michael J. Wolyniak
President, VAS

VAS 2021 Annual Meeting

Due to the ongoing COVID-19 pandemic, we regret that the Virginia Academy and Junior Academy of Science will not be able to hold an in-person meeting in 2021. However, we are pleased to announce that we will hold virtual gatherings for both organization in May of 2021. While we would clearly prefer to gather in person to celebrate the accomplishments of Virginia's scientists over the past year, the virtual format that we piloted successfully with the Fall 2020 Undergraduate Research Meeting promises to deliver an interactive environment that will allow us to preserve the scientific and business conversations that are the driving force of these meetings. The virtual format of these meetings are also promoting participation from individuals in parts of the Commonwealth that have traditionally been underserved by the Academy and point the way towards long-term outreach efforts to ensure that Academy activities are truly accessible to all of Virginia. Please visit the Academy website for registration information, and we hope to "see" you at our virtual meeting!

Submitted by **Michael J. Wolyniak**

President, Virginia Academy of Science
Associate Professor of Biology, Hampden-Sydney College

2020 Fall Virtual Undergraduate Research Meeting hosted by Hampden-Sydney College

Due to COVID-19, this year's annual Fall Undergraduate Research Meeting was held virtually on November 7, 2020. Begun in 2001, the meeting is designed as a way for undergraduate scientists from across the Commonwealth to prepare research posters and compete for \$500 grants in support of their ongoing research. Winners of these grants will present their final projects in May at the Virginia Academy of Science Annual Meeting to be held in 2021 at James Madison University.

At this year's annual Undergraduate Research Meeting, there were 29 student presentations from nine institutions in Virginia. Thanks to the generosity of the Academy, Hampden-Sydney College, and Longwood University, nine \$500 research grants were awarded at the Fall 2020 Meeting. Five honorable mentions were also awarded. Other highlights included a keynote presentation from Dr. Sujan Henkanathgedara of Longwood University on his successful research in conservation biology, and a career panel featuring scientists in academic, government, and industrial positions.

The Undergraduate Research Award Recipients were awarded to the following projects:

Development of computational models of prodrugs bound to nitroreductase enzymes

Madeline Clark; Mentor: Dr. Todd Gruber, Dept. of Molecular Biology & Chemistry, Christopher Newport University

The influence of naturalistic social stress on the gut microbiome in mice: Relevance in human psychopathology, **Sophie Dixon**; Mentors: Dr. Parrish Waters and Dr. Swati Agrawal, Dept. of Biological Sciences, University of Mary Washington

Determining gene flow between bald cypress and pond cypress

Joshua Sprouse; Mentor: Dr. Edgar Lickey, Dept. of Biology, Bridgewater College

Groundwater well monitoring and analysis in urban wetlands

Benjamin Heskett; Mentor: Dr. Laura Henry-Stone, Dept. of Environmental Sciences, Studies, & Sustainability, University of Lynchburg

Molecular basis of deficient immunity triggered by the adaptor protein Tom1

Neha Reddy; Mentor: Dr. Daniel Capelluto, Dept. of Biological Sciences, Virginia Tech

Developing a BSL1 titan cell model for cell cycle studies

Mary Richfield; Mentor: Dr. Michael Price, Dept. of Biology & Chemistry, Liberty University

Optimizing a biosensor-based assay for ubiquitination activation

Roma Broadberry; Mentor: Dr. Christopher Berndsen, Dept. of Chemistry & Biochemistry, James Madison University

Enhancing efficacy of norcantharidin in target cells by direct coupling to aptamer

Shannon Fehr and Lauren Western; Mentor: Dr. Lindsey Stevenson, Dept. of Biology & Chemistry, Liberty University

Biochemical characterization of a putative glutamate-2,3-aminomutase in methanogenic Archaea

Taylan Tunckanat; Mentor: Dr. Kylie Allen, Dept. of Biochemistry, Virginia Tech

Submitted by **Amorette Barber**,

President-Elect and The Program Chair for the 2020 Fall Undergraduate Research Meeting, Virginia Academy of Science

Associate Professor of Biology, Longwood University

Virginia Scientist in the Spotlight

“Virginia Scientist in the Spotlight” series introduces scientists in Virginia covering various scientific disciplines. Our guest scientist for this issue is:

Woodward S. (Woody) Bousquet

Professor Emeritus, Environmental Studies and Biology, Shenandoah University, Winchester, Virginia

I grew up in the Berkshire Hills of western Massachusetts, where I learned to love the outdoors through my parents and grandparents, and from natural history programs at the Berkshire Museum and Pleasant Valley Wildlife Sanctuary. The Berkshires provided plenty of places to explore!

When I began studying biology at Cornell University, my dream was to earn a PhD focused on the ecology of plants (particularly ferns or trees) or animals (reptiles, amphibians, aquatic invertebrates) that I had enjoyed as a youngster. My summer work experiences at nature preserves and camps drew me away from pure science to a related calling: science education.

I added teacher certification to my undergraduate program, developed the first nature programs for Poricy Park in Mid-

dletown, New Jersey, earned my master’s degree in natural resources at Ohio State, and taught at the McKeever Environmental Learning Center in Pennsylvania for three years. At the McKeever Center, I became fascinated with how people learn, or fail to learn, environmental concepts. I was also intrigued by the interrelationships between environmental quality and politics, economics, and religion.

A return to grad school was a logical next step, pursuing a doctorate in science and environmental education with a minor in community sociology. (Sociology? Yes, because addressing environmental problems effectively requires interdisciplinary perspectives.) I managed to survive an upper-level environmental economics course without having had a basic “econ” course beforehand, which is not an approach I’d recommend.

Eleven years teaching at Warren Wilson College in North Carolina’s beautiful Blue Ridge Mountains followed. I met my wife Jenny there, and we have two children who are now adults: Caitlin who teaches 4th grade in Alexandria, and Ben who works on the admissions staff at Vanderbilt University. We moved to Virginia in 1993 when I joined the faculty of Shenandoah University in Winchester.

This many-forked intellectual pathway demonstrated an im-



portant lesson to me: If you don’t know what academic specialty fits you best, study several different fields as a student. Then teach at a small college or university. You’ll be pulled, pushed, cajoled, and challenged in many ways ... and you can find satisfaction in many of them. While most of my teaching has been in ecology, water quality, and botany, I’ve also taught courses in environmental education, community and regional studies, and sustainability, and I co-taught a course in the nature of humanity.

Undergraduates have been my primary colleagues in research and service. We’ve collaborated in wetland studies, water quality investigations, ecological inventories of natural areas, and public information projects. I’ve built these experiences into regular Shenandoah University courses, with the service and research components directed towards needs identified in our home region, the Shenandoah Valley. My students and I were instrumental in establishing the City of Winchester’s first protected natural area - the Abrams Creek Wetlands Preserve. Our research findings have been used in watershed planning, stormwater management, threatened and endangered species projects, and the designs of two battlefield parks.

Since 1994, participation in the Virginia Academy of Science has motivated and challenged my students and me to strive for excellence
... contd. P7

“I’d encourage people of all ages to seek - and create - ways to break out of the career tracks and disciplinary boxes that confine us”

-Woody Bousquet



Amorette Barber named the Simpson Distinguished Professor

Amorette Barber, Ph.D., is an Associate Professor of Biology and the Director of the Office of Student Research at Longwood University. She was recently named Longwood University's Simpson Distinguished Professor for 2020-2021. This award was established in 2015 through a generous gift from Murray S. Simpson, Jr. and Cora S. Simpson to recognize and support faculty who have demonstrated a sustained commitment to pursuing outstanding scholarship resulting in publications, presentations, or creative work in the visual or performing arts. The Professorship is awarded annually by the President, in consultation with the Provost, to a tenured faculty member selected from nominations by Academic Deans.

Her research focuses on enhancing immune responses to cancer. Current cancer treatments such as surgery, chemotherapy, and radiation result in adverse side effects. Therefore, the development of novel therapies that specifically target tumor cells and minimize damage to healthy cells is desirable. One option is to use cells of the immune system, specifically T cells, which kill cells that appear dangerous or foreign. To maximize tumor cell-targeting by T cells, genetic engineering is used to express receptors that enhance tumor cell recognition. These receptors, named chimeric antigen receptors (CARs), endow the T cell with a way to recognize the tumor

cells and activate many cellular functions to eradicate the tumor.

During the past nine years at Longwood University, Amorette has published twelve peer-reviewed research papers, and she received the VAS J. Shelton Horsley Award for one of these publications in 2015. Most importantly, the undergraduate research students in her lab played an integral role in the development and publishing of these studies. One of her recent publications described the creation of a novel CAR for tumor therapy (chPD1) and has garnered much interest among the research community, including being highlighted in "Cell Therapy News" in July 2017 and is one of the Top 5 Cited articles in *Immunology* in 2017. Furthermore, she developed a human version of the chPD1 receptor, received an international

patent for the receptor, and her research was featured in NPR's "Academic Minute" in summer 2020. She also has been invited to give seminars on her research at numerous conferences, including at the American Association for Cancer Research conference, the Cell Symposia: Cancer, Inflammation, and Immunity Conference, at Kite Pharma (one of the leading biotechnology companies that develops CARs for cancer therapy), the Cleveland Clinic, an International Conference in Biotechnology in Morocco. She was the Sidney S. Negus Memorial Lecturer at the Virginia Academy of Science annual meeting in 2018. Recently, her patent for the chPD1 receptor was licensed for clinical development by Kiroomic BioPharma. She is heading up the chPD1 program for Kiroomic and is a member of their Scientific Advisory Board.



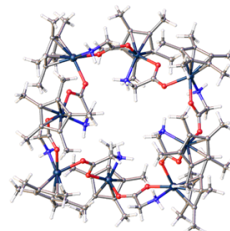
Chemists Can Make Some Really Weird Molecules

A molecule made by Dr. David Morris while working toward his Ph.D. in the Joseph Merola Group at Virginia Tech was chosen last year as one of the "Molecules of the Week" by the American Chemical Society. It was chosen, frankly, because it was "quirky". It has no real application, but it is quite the structure. It is an octametallic complex of organometallic iridium.

Compounds that come together to form a giant ring. The "octametallic" nature-inspired Dr. Christine M. Duchane, also working toward her Ph.D. at the time in the Merola Group, to draw an octopus putting the structure together.

The story about this can be found at: <https://www.acs.org/content/acs/en/molecule-of-the-week/archive/o/octamer-of-iridium-complex-cations.html>

Submitted by **Joseph Merola**, Virginia Tech



Virginia Academy of Science Resolution of Vaccination

What is vaccination?

Vaccines are one of the most convenient and safe preventive care measures available. A vaccine stimulates our immune system to recognize and fight off any foreign invaders in the body, and after getting vaccinated we develop immunity to these foreign agents. If our body is exposed to these agents later, our immune system will immediately destroy them and prevent us from getting ill. This is what makes vaccines such powerful tools - unlike most medicines, which treat or cure diseases, vaccines prevent us from getting diseases in the first place. Furthermore, vaccines can protect us from diseases for which there is no cure. One such example is polio. As recently as the 1950s, polio was America's most-feared disease, causing death and paralysis in its victims; however, due to vaccination, there are now no reports of polio in the United States. Another success story comes from smallpox vaccination that eradicated the disease worldwide so that our children no longer run the risk of catching this dangerous disease. Overall, immunizations currently prevent 2-3 million deaths every year worldwide from diseases like diphtheria, tetanus, pertussis, influenza, and measles.

Why should you be vaccinated?

It is true that no medical treatment or drug will ever be 100% effective and safe for all people. However, history and science inform us that the benefits of vaccinations far outweigh the risks involved and that

the vast majority of societal objections to vaccinations derive from misinformation and hysteria. In short, we feel that all people that can be vaccinated should be vaccinated. The scientific evidence accumulated over many decades argues overwhelmingly that vaccination is among the single best preventative measures a person can take not only for their own health but for the health of those around them. Without mass vaccination, common diseases of the past like diphtheria, smallpox, and measles would continue to run unchecked through the population and needlessly disable or kill thousands of people, in many cases children. The constant presence of lethal infectious disease in the population means the constant disruption of society, including economic disruptions that can lead to mass unemployment and poverty. It is also a fact that there are several people in the community that, for whatever reason, cannot receive vaccines due to compromises to their own immune systems. These people rely on "herd immunity", or immune protection from a disease in a significant majority of the population, to protect themselves. It is our duty as good citizens to protect those around us that, through no fault of their own, are unable to protect themselves.

Why do some people elect to not be vaccinated?

In recent years, there has been a rise in the number of Americans unwilling to vaccinate, which presents a health concern that not only hurts those individuals not vaccinated but

also the general population. One of the more common objections is for religious reasons or reasons of conscience. Virginia has a long history of protecting religious liberty beginning with the Virginia Statute for Religious Freedom written by Thomas Jefferson. We respect these central and sincere beliefs felt by some in the community but also hope that these beliefs are accompanied by a rational consideration of the welfare of family and community in making decisions to vaccinate.

More often, the reasons for opposing vaccination derive from popular misinformation that leads to objections based on personal beliefs or philosophical reasons. These include beliefs that getting diseases prevented by vaccination strengthens the immune system, that the probability of getting diseases prevented by vaccination is incredibly rare, or that the side effects of vaccines are worse than the preventable disease. Several individuals also subscribe to safety concerns that have been found to be minimal many times over by numerous scientific studies, including the presence of toxic adjuvants and preservatives, linkages between vaccination and autism, sudden infant death syndrome, or Guillain-Barré syndrome, and the presence of severe side effects like febrile seizures allegedly connected to receiving multiple vaccines at the same time. Finally, others object to vaccination due to misinformation or mistrust of the healthcare system due to a misunderstanding of the scientific process, media reports or social media posts that sensationalize rare side effects, or a small minority of medical doctors that endorse or practice alternative medicine. Unfortunately, the scientific community must also overcome a lack of trust from the general public derived from the historical mistreatment of minority populations (e.g., the mistreatment of African-Americans by the scientific and medical community as exemplified by the Tuskegee syphilis study and the treatment of citizens like Henrietta Lacks), the profit motive of

...cont'd. P8



The history and science inform us that the benefits of vaccinations far outweigh the risks involved and that the vast majority of societal objections to vaccinations derive from misinformation and hysteria.



RVA Environmental Film Festival Awards UR Biology Professor 'Best Short Film' for Work Exploring Ocean Pollution through Art

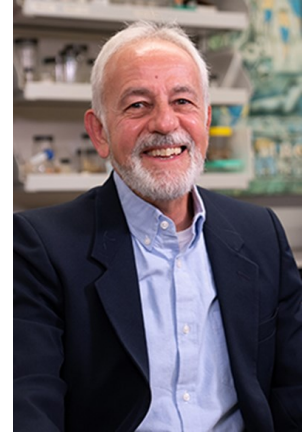
Eugene Maurakis, a University of Richmond research scientist and adjunct professor, and VAS member has been awarded "Best Short Film" in the RVA Environmental Film Festival for "Plastic Oceans," which explores plastic pollution in oceanic environments through art.

Maurakis, alongside his collaborator Tyler Rhodes, an animator, was one of six winners in this year's festival. Maurakis, who also serves as science advisor for Virginia Public Media and Chief Scientist Emeritus of the Science Museum of Virginia, is an evolutionary biologist who specializes in environmental sciences. Also an accom-

plished artist, he works to combine the arts and sciences to communicate science-related topics and issues in a way the general public can understand. "Plastic Oceans" is his latest example of this type of project.

"The inspiration for 'Plastic Oceans' came from my encounters with green sea turtles, which grabbed my attention while spending four summers researching distributions of coral reef fishes in rocky and sandy beach habitats in the Caribbean," said Maurakis. "This marine research, coupled with my experiences in creating interactive exhibitions, laboratory

experiences, and using art to share science, combined for this film."



Liberty University Researchers Study the Effects of Rainfall on *Giardia* and *E. coli* in the James River Watershed

Liberty University researchers are beginning their fourth year examining the effect rainfall has on *Giardia* and *Escherichia coli* in the James River Watershed. Dr. Alan L. Gillen is leading the research team on a grant from the Provost Office of Liberty University (PRI). The goal of the study is to examine the relationship between concentrations of *Giardia* and *Cryptosporidium* and a variety of more easily measured microbial, water quality indicators (*E. coli*, *Klebsiella*, *Citrobacter*), and meteorological (rainfall) parameters. Coliforms (especially *E. coli*) are indicators of parasitic diseases that can cause diarrhea. A local medical doctor reported that he would commonly see 25-30 patients per summer who were involved with recreational activity on the James River. We have observed the greatest dangers are times after heavy rainfall or snow.

Starting in 2017, we noticed the variability of concentrations of *Giardia*, *E. coli*, and other coliforms in surface waters at or near Liberty University (Lynchburg, VA). New rain records were reported in

2018 (65") and 2020 (70"), respectively. In these years, the rain was almost double for what we experience in Lynchburg. In response, we have observed exploding bacteria and parasite numbers. In particular, we observed high numbers of *Giardia* after rain and snowfall. The effect rainfall has on parasite concentrations is due in part to increased particulate matter in the water column following surface runoff, sediment stirring, and increased beaver presence.

This year the research team will continue to collect water and test local surface waters of the James

River system; LU Library Lake, Camp Hydayway Lake, and Opossum Creek. The team includes Jason Conrad, Gia Albani, Jared Mast, Xiaoxuan, Yu, Lauren Western, Alora Nkete, Emily McGuirt, and others in the Parasitology class at Liberty University. The team believes that safe drinking water and recreational waters are important for public health in Virginia and around the world.

Submitted By **Alan L. Gillen**

Professor of Biology, Department of Biology & Chemistry, Liberty University, Lynchburg.



Virginia Scientist in the Spotlight *Contd. from P3*

in our research and to share our findings with peers at VAS meetings. To maximize the impacts of our efforts, we've also presented our results regionally at public meetings, and we have distributed project summaries as technical reports.

I've served the Virginia Academy of Science – which has given so much to me – in a number of capacities. These have included two rounds as a Botany Section officer, chairing the recent ad hoc committee on publicity, and, in 2018-19, a term as the Academy's President.

After 26 years at Shenandoah University, I retired from full-time employment in August 2019. As most people who retire will say, professional engagement rarely ends with retirement. My involvement in environmental protection and education projects in the Shenandoah Valley continues. Alpine skiing helps make up for some of the exercise I miss from field research and field trips; I skied seven ski areas during a week-long road trip through the Southeast in January. Among my newer

pursuits are trying to learn the Romanian language, and building a deeper understanding of European history and culture through reading, seminars, Facebook, and online resources.

Following my intellectual nose through my undergraduate and graduate education, through professional employment, and through personal pursuits has been a

truly joyful journey. I'd encourage people of all ages to seek - and create - ways to break out of the career tracks and disciplinary boxes that confine us.

Submitted by **Woodward S. Bousquet**

Past President, VAS
Professor Emeritus, Environmental Studies
and Biology, Shenandoah University



President's Message *Contd. from P1*

in support by providing classroom mentorship opportunities from Academy members to provide middle and high school students with authentic research experiences that could be presented at the Virginia Junior Academy of Science Spring Meeting. While the success of this project has varied with the same frequency as school shifts from in-person to virtual learning, we have laid the foundation for what has potential to become a signature activity of the Academy going forward.

We have witnessed organizations of all sorts struggle with ways to maintain their meetings and gatherings in a time in which such meetings rapidly become COVID super-spreaders. While we are disappointed that we will not gather in person for a Virginia Academy of Science/Junior Academy of Science meeting this May, I am in the debt of everyone at the Academy and Junior Academy that have worked hard to develop a virtual 2021 meeting that allows us to continue the business of the Academy while celebrating the science that has been accomplished in the Commonwealth despite COVID-related roadblocks. I am also encouraged by seeing

registrants for the Junior Academy meeting from parts of the Commonwealth that are traditionally underserved by our programming. Perhaps the challenge of the pandemic will allow us to build on these new connections and develop new ways to truly reach scientists and students in all parts of Virginia.

We have witnessed the resurgence of the long quest for social justice and equity for all Americans. We at the Academy have begun our own efforts to assess the degree to which our programs and policies support diversity, equity, and inclusion of all Virginians by forming an executive level committee that will work to remove any detected barriers as well as develop resources and programming that will put the Academy at the forefront of ensuring equity for scientific opportunities across the Commonwealth. The history of equity and inclusion in Virginia is not a proud one, and we at the Academy can do our part to help erase the barriers that for too long have held back significant segments of the Commonwealth's population.

We have witnessed (and continue to witness) a once-in-a-century calamity that causes us all to reflect on where we have come from and where we will be going. In this spirit, the Academy has begun its efforts to celebrate its Centennial in the 2022-23 academic year. This will be an extraordinary undertaking that will look to celebrate the many contributions this organization has made to the scientific enterprise in Virginia and position itself to remain a leader in this mission in the 100 years to come. We urge all of you to be on the lookout for opportunities to contribute to this planning so that the Academy can properly celebrate the strong community that is at the heart of this organization. I am grateful for all of the support I have received as President and look forward to continuing to work with you in the years to come.

Submitted by **Michael J. Wolyniak**

Associate Professor of Biology, Hampden-Sydney College
President, Virginia Academy of Science

Virginia Academy of Science Resolution of Vaccination

Contd. from P5.

private companies that produce vaccines, and previous instances of failing to ensure the safety of drugs during clinical trials such as occurred with Vioxx and fen-phen.

Conclusion

The vast majority of the concerns listed here come from a well-meaning but misguided fear that a medical treatment proven to promote good health will do just the opposite. With rare exception, this could not be further from the truth. Mathematical modeling reveals that universal vaccination can largely curtail or eliminate the threat of most infectious diseases even if the vaccine is only ~70% effective (Bartsch et al., 2020). This argues for the use of vaccines as a public health tool to be used by as many in the community as possible to protect as many people as possible. In summary, the Virginia Academy of Science feels that it is our responsibility to the Commonwealth of Virginia and the nation as a whole to work against misinformation on vaccination and to promote all who are able to receive vaccinations to protect themselves and to protect society.

Suggested further reading:

General information on vaccines and vaccination from the Centers for Disease Control (CDC):

<https://www.cdc.gov/vaccines/index.html>

Information from the CDC on vaccine safety:

<https://www.cdc.gov/vaccinesafety/concerns/index.html>

Reasons to be vaccinated, from the U.S. Department of Health and Human Services (HHS):

https://www.vaccines.gov/get-vaccinated/for_parents/five_reasons

Information to Judge at the Virginia Junior Academy of Science

The Virginia Junior Academy of Science will hold its 2021 VJAS Research Symposium in conjunction with the Virginia Academy of Science Annual Meeting virtually in May 2021. The purpose of this meeting is to give approximately 750 students in grades seven through twelve from throughout the Commonwealth the opportunity to present papers, which will report original research they have conducted. At least a month before the virtual presentations, judges will receive research papers to read and score online, via the Reviewer web platform. On a date to be determined, papers will be virtually presented every 15 minutes from 9 a.m. through 4:30 p.m. More information about the online judging process and virtual presentations including web links, will follow in early Spring.

How can we accomplish this goal? In order to achieve this monumental task many volunteers are needed. Each of the sections requires a Head Judge and 2 or 3 judges. Experts from all fields of science are needed. Each of the sections requires a Head Judge and judges, in which they are needed in all fields. There are both middle and high school categories from which you may choose. Categories are evaluated and revised each year so you may note different categories below than were available last year. Judging requires one to read and evaluate no more than twenty-two papers, which will be available for access online via Reviewer platform. The judges are asked to be present in the virtual meeting, with those papers, on the day of virtual presentations to complete the scoring.

Help us to make this an event to remember and register today by filling out and by submitting this form. Registering today will secure your first choice in categories. You will, at a later date, receive notification of the category you will be judging, access to online research papers to read, scoring rubric, schedule, and other important information. We will update you with more details as the logistics are worked out. We truly appreciate all that you do and hope that you will be willing to contribute your time and effort again.

Please pass this information on to any others who may be interested in assisting the VJAS. The entire program is made possible by your volunteer efforts, and its success rests on your willingness to help. If you have any questions, please do not hesitate to contact me at 1-757-897-3104 (phone). Thank you in advance for your assistance.

Susan Booth, VJAS Director,
susan.science@gmail.com

Please complete by March 15, 2021, or you may not receive your first choice.

Disclaimer: Completion of form and reply email from the Academy does not mean you have been accepted to judge.

Link to the form: <http://vjas.org/judges.html>

Updated Institutional Membership Guidelines

The Virginia Academy of Science recently passed new guidelines for Institutional Membership. These new guidelines are intended to encourage more institutions to support the Virginia Academy of Science through institutional membership and also to provide more benefits to institutional members. These changes to the by-laws were approved at the Spring 2020 Council meeting. Institutional and Business Membership is available to colleges/universities, businesses, and industrial organizations. Benefits included with institutional membership include:

- Listing on VAS webpage page as an Institutional Member (name, logo, and live link to webpage for Institutional Members)

- Acknowledgement (name/logo of Institutional Members listed) and one-page Ad in Virginia Academy of Science Program (Annual Meeting program) and in the VJAS Blue Book
- A complimentary subscription to the Virginia Journal of Science
- Two complimentary registrations to the Annual Meeting

Free Student Memberships are also provided as part of the Institutional membership. The number of free student memberships is based on the selected Tier.

Tier 1- \$570- 10 student memberships
Tier 2- \$870- 20 student memberships
Tier 3- \$1170- 30 student memberships

The Virginia Academy of Science welcomes Longwood University as a new Institutional member.

Please encourage your college/university, business, or industrial organization to join the Virginia Academy of Science as an Institutional Member.

Submitted by **Amorette Barber**
President-Elect, Virginia Academy of Science
Associate Professor of Biology, Longwood University

VSU Professor Conducts Impactful Food Science Research

Dr. Yixiang Xu is a Professor of Food Science at the Agriculture Research Station in the College of Agriculture at Virginia State University (VSU). Dr. Xu is part of the team carrying out VSU's Land Grant mission by conducting research and disseminating science-based information to farmers, processors, and consumers. Her program also serves as a platform for training the next generation of food scientists. Under her leadership, the program has made significant progress and contribution to VSU's visibility and success in research, teaching, and outreach over the last ten years.

Dr. Xu's publication record is impressive. She has published 65 research papers in peer-reviewed high-impact journals and has co-authored four invited book chapters in the areas of food science. In addition, Dr. Xu has a distinguished fund-raising record. As Principal and Co-Investigator, she has applied for highly competitive grants from various funding agencies (federal, state, and industry) and secured funds totaling more than \$ 2.0 million. In the process, she has built enduring and mutually beneficial collaborations with both internal and external partners.

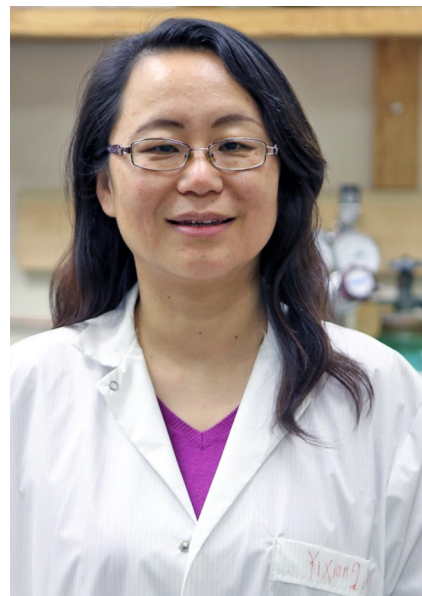
The impact of Dr. Xu's research attests to her originality and scientific acumen. Her publications have been cited a record 2969 times by peers in the field from all over the world. Her publications have an h-index of 23. One of her papers has been cited over 800 times since it was published in 2005. Another paper by Dr. Xu ranks #6 most cited publications among 1242 articles published in Journal Food Science & Nutrition. In recognition of her work, Dr. Xu has been invited to serve in various professional capacities including: (1) Associ-

ate Editor and Editorial Board Member of highly regarded periodicals; (2) Organizing committee member, session chair, and invited speaker in International Conferences; (3) Special invitation to serve as resource person in a workshop hosted by the Office of the Governor of Virginia; (4) Expert reviewer for a book proposal for potential publication in CRC press; and (5) Panelist to evaluate grant proposals submitted to USDA-NIFA and other granting institutions. Within the same period, Dr. Xu has served as secretary and vice-chair of Agriculture, Forest and Aquaculture section of the Virginia Academy of Science.

Dr. Xu's records on student training and outreach are also exemplary. She has invested time and resources in training and mentorship by providing many students with opportunities for hands-on training to enhance their academic experiences and market readiness. Her students have attended and made presentations at various conferences, and won awards and other accolades that as reported by various media. Students under her guidance have also enhanced their resumes and experience by co-authoring scientific publications.

It is noteworthy that Dr. Xu is one of a few scientists leading the effort to entrench public-private partnerships at VSU by forging cooperative linkages with local small business as well as international food and pharmaceutical companies.

Overall, Dr. Xu has demonstrated success and documented achievements that clearly establish her as a leading researcher and educator in her field of specialization.



The Hunt is Afoot for Virginia Cave Water Bears!

By day, Dr. Amy Edwards analyzes water for Hanover County Public Utilities as a Laboratory Technician. By night (it's dark in caves, so we'll call it night), she's a cave and karst scientist. Formally trained in geochemistry, water quality and hydrology, she recently delved into the world of microbiology. Her current research focus is finding and imaging water bears (a.k.a. Tardigrades) in cave and karst environments.

A preliminary study in 2018 in Virginia and West Virginia searched for water bears in lichen, moss, leaf litter, and sediment in the entrances and Twilight Zone of caves (The Twilight Zone is the area between the entrance and where the cave goes full on dark).

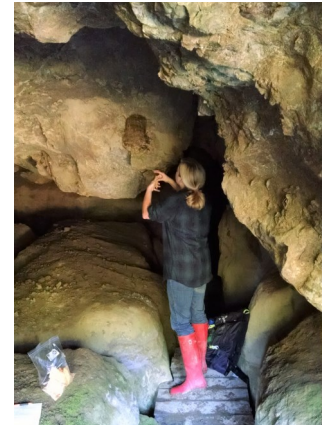


The current study underway, funded by the Richmond Area Speleological Society through the Cave Conservancy of the Virginias, will extend the search into the dark zone of a cave that is the end spring drainage for a large karst system in western Virginia. This study will add water collection for environmental DNA (eDNA) analysis and Next Generation Sequencing as a method of detecting water bears, as well as salamanders, beetles, and amphipods. Field collection is indefinitely delayed due to COVID-19, as the Virginia Department of Game and Inland Fisheries has temporarily closed access to caves on agency lands. But when access is reinstated, the hunt will again be afoot!



Amy uses science and nature as muse for her art – the microscopy studies inspired a mosaic of a water bear. She also wrote and illustrated a children's book for cave science. *Five Little Cave Scientists* highlights the various STEM approaches to cave science inside the cave, as well as sample

analysis in the laboratory, publishing, and presenting results of research. She even included a safety adage she heard many moons ago from her high school chemistry teacher: "If you do what you oughter, add acid to water!" She still sings this to herself (in her head) every time she creates acid dilutions in the laboratory today. Hopefully, this book will encourage the next generation to pursue scientific research, especially in the world-class caves of the Virginias!



SCAN this QR Code to buy "Five Little Cave Scientists"

SCAN this QR Code to buy "Five Little Cave Scientists"



Virginia Academy of Science and VJAS Virtual Symposium!

The 2020-21 academic year will no doubt go down as one of the most challenging times for the Commonwealth's science teachers ever. With the constant presence of the COVID-19 pandemic and the uncertainty of teaching science courses in an online format, there have been unprecedented challenges facing teachers all year.

The Virginia Academy of Science and Junior Academy of Science have worked together this year to help with this situation by providing members of the Academy as online mentors for middle and high school classrooms to perform research projects. The Academy has placed ~30 members with

classes across the Commonwealth to develop and implement projects of direct interest to the middle/high school instructors, and the Junior Academy has encouraged the students in these classes to participate in their annual meeting to be held online this May.

Both academies intend to continue this project after the pandemic ends as a way to encourage high school students to earn the Commonwealth's new "STEM and the Environment" seal on their diplomas by engaging in authentic research that is presented in a juried competition setting. Teachers who are interested in becoming involved with this program in the

future are encouraged to contact Dr. Michael Wolyniak from the Academy (mwolyniak@hsc.edu) for more information.

2021 Virtual VJAS Virginia Junior Academy of Science

A competition for middle-high school students (grades 7-12) that builds on young research scientists. The competition is open statewide for school and individual membership now and online paper submission has been extended to March 10. Student Virtual Competition will be hosted by Williams and Mary on May 15.

More information at: www.vjas.org

VAS Centennial Event

The Virginia Academy of Science held its first official meeting in April 1923, at the College of William & Mary. The Academy is making plans for a Centennial Celebration, with many actions taking place in 2022, as we move toward a celebration at The College of William & Mary in the Spring of 2023.

The preparations for this celebration have begun and President Michael Wolyniak appointed Richard Groover to be the Centennial Committee Chairperson. A Centennial Committee held its first meeting in January 2021, giving the Academy a great

deal of time to develop ideas and planning before the celebrations become public.

Yet to be confirmed, events for the Centennial may include: recognition of outstanding scientists who are or have been members of the Academy, recorded testimonials from famous individuals, dignitaries invited to speak at media events, a proclamation from the Governor, an event honoring of Presidents and Fellows, special recognition of the Science Museum of Virginia that was promoted for its creation by the Academy and two other organizations, the creation of the Junior Academy of Science, the development and support of the updated publication of the Flora of

Virginia, fundraising events to coincide with the Centennial, the spotlighting of historical events that included the Academy and its leadership, such as the Scopes Monkey Trial and the formation of the Virginia State Parks. The list of possible focus for the celebration continues to grow.

Interested VAS members getting invitations to the Centennial Committee ZOOM meetings now number 27, but all Academy members are welcome to "attend." This committee is now meeting every other month.

For information, please contact **Richard Groover** at rgroover@reynolds.edu.



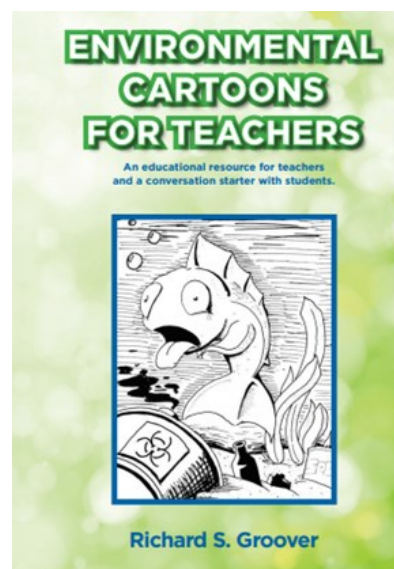
New Book: Environmental Cartoons For Teachers

The Environmental Cartoons for Teachers is published. This book will be a useful educational resource for teachers, at any level of education. With over 40 cartoons, teachers can copy the images to assist with teaching environmental and biological topics to students. The author, Dr. Richard Groover, recently retired from Reynolds Community College, has used these cartoon for years.

"The cartoons are great conversation starters for students," states Groover, "they reveal interesting images on many topics covered in environmental science, earth science, and other biology courses." Across the page from each image is a short statement that relates to the cartoon. One cartoon mentions that insects and pollinators provide a service for three-quarters of all our food crops, a value of \$500 billion dollars per year. Another cartoon mentions the "Wood Wide Web" and how trees "talk" to each other.

Dr. Anne Mannorino, VAST, reviewed the book. This book uses the power of over 40 visual cartoons to address environmental issues today. The focus is on climate change. As you read the book, you are first shown a cartoon in black and white with specific captions. Then the environmental issue is explained in a short paragraph. The book could be used as a starting point or ending point to discuss environmental issues. Not a lot of detail is given for each environmental issue, but it provokes the reader into wanting to learn more. There are also facts and figures referred to throughout the book. The websites are listed with the page numbers at the end of the book. If you teach any form of environmental sciences, then this book could be the stimulus needed to start much needed important conversations.

The book is on sale for the price of \$12.00. For more information contact rgroover33@gmail.com



Longwood Professor's Research Charts the Illegal Elephant Trade

It's a multibillion-dollar industry that most people are hardly aware of.

The illegal wild animal trade, in which exotic animals like giraffes, tigers, and elephants are captured and sold on the black market to the highest bidder, is much more widespread than the average person would imagine. Partly spurred by the summer's smash Netflix documentary "Tiger King," new light has been shed on the issue. Now a Longwood biologist has teamed up with Sri Lankan colleagues to study the problem and recommend solutions.

Dr. Sujan Henkanaththegedara, assistant professor of biology, joined a team of Sri Lankan scientists as well as colleagues at Oxford Brookes University on the paper,

which charts the illegal trade of elephants. The team looked at highly valued Asian elephants on the island of Sri Lanka.

"Sri Lanka has the second-largest population of Asian elephants in the world, and our team documented 55 cases of elephants being illegally captured and traded over a ten-year period," said Henkanaththegedara. "These are an endangered species and under significant threat from this illegal practice. Our team uncovered corruption, insufficient laws and regulations, and a lack of enforcement that contributed to the pervasiveness of the illegal elephant trade, and then made recommendations to curb the practice and help conserve the species."

Many of the smugglers, the study found, operate with impunity in

national parks and elephant sanctuaries on the island. A system of bribes and corrupt officials who profit from the illegal elephant trade keep the business flourishing, as young elephants that are captured in the wild are often registered as born in captivity.

The study is the first to look at the extent, mechanisms, and impacts of Asian elephant smuggling in Sri Lanka.

"These elephants are a precious species," said Henkanaththegedara. "The herds have a complex social structure and very real trauma is inflicted on these wonderful creatures when a youth is captured and taken away. We must do what we can to enforce the international laws that protect them."

The team recommended several steps to help curb the practice, including a quicker judicial process, penalties for corrupt officials, more transparency regarding those licensed to hold captive elephants, and an enactment of a national policy on captive elephants.

The team's paper was published in the November issue of the prestigious journal *Nature Conservation*.



VSU Researcher Named Associate Editor of New International Food Journal

The American Chemical Society (ACS) has named Virginia State University (VSU) researcher Dr. Yixiang Xu, as associate editor of its newest publication, ACS Food Science & Technology.

ACS will launch the new journal in 2021, and it will feature "cutting edge original research in all areas of food science, technology, engineering, and nutrition," according to its website. The journal will focus on areas of food security, food preservation, and health-promoting food ingredients.

Xu, an associate professor of food processing and engineering at the Agricultural Research Station (ARS) in VSU's College of Agriculture, was invited to serve on the editorial staff by ACS deputy editor Dr. Coralia Osorio Roa of the Universidad Nacional de Colombia-

Sede Bogotá. In a letter to Xu, Roa said the VSU researcher was invited because of "her expertise not only in food science but also in food packaging, bioprocessing materials, and coatings."

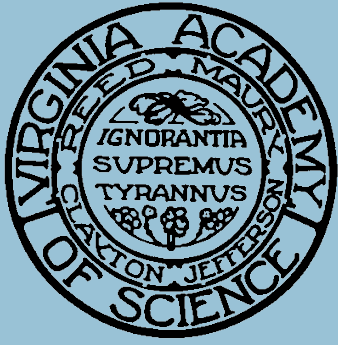
ACS is a nonprofit organization founded in 1876 and chartered by the U.S. Congress. It is one of the world's largest scientific organizations with more than 150,000 members over 140 countries. Its mission is to advance chemistry and the work of its practitioners, while improving people's lives through the transforming power of chemistry. ACS publishes more than 60 scientific magazines and journals.

"It is a great honor for me to be invited to be part of the editorial team of this journal and have an

opportunity to work with prestigious researchers around the world," Xu said. "It is also partly a recognition of impactful food science research conducted in our research program at the Agriculture Research Station at Virginia State University."

Xu heads the Food Processing and Engineering Program at ARS. Her research specifically focuses on novel food processing and packaging technologies for healthy food development and shelf-life extension. She earned a bachelor's in food engineering and a master's in Food Science and Technology from Southwest Agriculture University in Chongqing, China, and earned a Ph.D. in Food Science and Technology from the University of Nebraska, Lincoln.

Know your VAS logo



1. What is the flower depicted in the inner circle of the VAS Logo?

2. Who are the four famous Virginia Scientists listed in the middle ring of the Seal or Logo?

3. What is the Academy's Maxim?

Answers: 1. The flower is the Dogwood. It is in full bloom at the top of the seal and as a bud at the bottom of the seal. 2. The four famous scientists are Walter Reed, a physician, Matthew Fontaine Maury, an explorer and cartographer, John Clayton, a botanist, and Thomas Jefferson, an agriculturist and educator. 3. Of course everyone should get the last question correct, the maxim is "Ignorantia Supremus Tyrannus" Ignorance is the greatest tyrant.

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VAS Office Hours:

Tuesday & Thursday ~11 am to ~1 pm

1 Million Observations, 13,500+ Species *Contd. from P1*

teachers, students, and naturalists representing many educational institutions and organizations across the state joined the program and shared their stories of biodiversity exploration and citizen science.

Dr. Henkanaththedegara added that "This is so exciting! We never thought that a simple idea would grow to 1 million observations in five months. This reflects the power of crowd-sourcing and citizen science. This data is very useful for wildlife management and conservation as well as biodiversity research. The other cool thing about iNaturalist is that anyone can access this free, research quality data". Dr. Henkanaththedegara and the Virginia BioBlitz team invite anyone interested in nature exploration and citizen science to join the project and be part of a statewide STEM project. A dedicated website (<https://sites.google.com/view/virginiabioblitz/>) explains the scope of the project, instructions on how to use iNaturalist, BioBlitz stories and activities.

"Virginia BioBlitz provides a great opportunity for Virginians of all ages to get out and explore outdoors while also participating in the global research project, iNaturalist. This is a fun, interactive, and safe way to become a citizen scientist during a time when many of our traditional hands-on STEM education opportunities are limited. By recording and sharing your

observations, you'll create research quality biodiversity data for scientists working to better understand and protect nature!" said First Lady Pamela Northam.

You can check the latest status of our project by visiting Virginia BioBlitz iNaturalist Project (<https://www.inaturalist.org/projects/virginia-bioblitz>). More importantly, we are not done with this project. This is just the beginning! So please share your observations today, tomorrow, and every day!

If you have any questions about the Virginia BioBlitz Project, please contact **Sujan Henkanaththedegara** at Henkanaththedegaras@longwood.edu.

SCAN this QR code to explore the Virginia BioBlitz **information** website.



SCAN this QR code to explore the Virginia BioBlitz **iNaturalist** Project.



We Invite You to Contribute to *Virginia Scientists*

Virginia Scientists is the official newsletter of the Virginia Academy of Science (VAS). This publication offers information for VAS members, such as upcoming events, past events, scholarships/awards information, accomplishments of VAS members and other timely information. We electronically publish Virginia Scientists twice every year and circulate to all current members and academic institutions.

We would like to extend an invitation to you to submit articles to Virginia Scientists and/or use the advertising space. We are currently accepting articles for the next issue.

The length of the article should not exceed 500 words. Any exceptions must be get approved by the editors prior to submission. Please consider the following categories to submit.

- **Member achievements** – your publications, awards and other professional achievements related to science
- **Upcoming events** – information about educational and professional events
- **Historical notes** – articles related to history of science and scientists in Virginia, and VAS

- **Summaries of scientific studies** related to Virginia
- **Advertisements** (commercial events, products etc.)

If you have ideas beyond these categories and think it is suitable for publication here, please check with editors before you proceed. Article and any accompanying high-quality photographs must be electronically submitted to Sujan Henkanaththedegara (henkanaththedegaras@longwood.edu).

If you would like more information about the advertising space, please contact Debbie Neely-Fisher (dneely-fisher@reynolds.edu).

Please let us know if you need more information and/or have any questions.

Sujan Henkanaththedegara
Deborah Neely-Fisher
Editors, Virginia Scientist