ONE HEALTH INITIATIVE

Quarterly Newsletter
Spring 2022

Director's Update
Dr. Deb Miller

Happy Spring! As we watch Nature awaken from a long winter sleep, I hope that each of you are likewise becoming rejuvenated and ready to celebrate life. I know that I get especially eager to prepare the gardens with the anticipation of a healthy bounty. However, if you are like me, your garden often feeds more of the non-human creatures despite attempts to battle the onslaught of pests. Regardless, I enter the season with much hope for a bountiful year!

Dr. Elizabeth Strand joined our leadership team as our team science expert. Her role is not only to help the OHI run as a well-oiled team, but also to help *your* teams run smoothly. In this newsletter, Dr. Strand provides a summary of the recent Science of Team Science workshop that she led. I have to say that this was a fun event and serves as the first of many opportunities for us to build our skills of working in teams. It's also something that we'll incorporate into our One Health minor curriculum, so that students are armed with the skills necessary to be excellent team leaders and team members.

For this issue of the OHI newsletter, our research highlight is none other than me and my sea turtle research group. Many of you are likely not aware that I research sea turtles, and I thought it a good opportunity to share a few of the problems that we are tackling. Although there are many wicked problems at play when it comes to the conservation status of sea turtles, climate change definitely ranks high on the list. Elevated ocean temperatures and elevated beach temperatures are a double whammy for these species that live in the ocean and lay their nests in the sand. Furthermore, whereas elevated beach temperatures stress the hatchlings, they can provide an environment in which pathogens flourish, which obviously is not a good combination. Our team is working hard to identify key areas to mitigate the negative impacts on these imperiled species.

Spring on UT campus, photo courtesy of Josh Queener.

To keep you updated about ongoing projects, we highlight the Chronic Wasting Disease (CWD) working group in this issue. CWD is pummeling our native deer species, and for Tennessee, it is urgent that we act now in full force to keep it from spreading across our state. Led by Drs. Eda and Houston, the UT CWD working group is energized and ready to battle.

I hope that each of you have been able to participate in at least some of the many activities hosted by the OHI. We have many more planned for this next quarter and want to inform you of those so that you can mark your calendars. As mentioned in the last issue, our Lunch and Learn series has returned to the last Thursday of each month. You can keep track of these and many more activities through our website. While you're there, tune in to our podcast series with comedian Shane Mauss! We add at least one new episode a month, and we're really pleased with the series.

Sustainable Living: Dr. David Ader

Amphibians: Dr. Matt Gray

Nutrition: Dr. Hollie Raynor

Economics and One Health: Dr. Charles Sims

Check out all available episodes at onehealth.tennessee.edu/podcasts.

We also want you to be aware of the resources for K-12 educators, information about the one health minor, and various research resources and educational opportunities that you can access via our website. There is even a donation button for those who want to support OHI activities! So please check it out.

I hope that you enjoy this read and, as always, please join us in uniting disciplines to protect and promote the health of all life on Earth!

UTOHI Research

Investigating the Impact of Climate Change on Marine Life: How Are Rising Beach Temperatures Impacting the Survival of Leatherback Hatchlings?

Investigators: Deb Miller and Jeanette Wyneken

The leatherback sea turtle (*Dermochelys coriacea*) is the largest species of sea turtle and the sole extant genus of the family Dermochelyidae. All leatherback populations are considered endangered under the Endangered Species Act, but isolated populations—such as the one located in the Pacific Ocean—are critically imperiled and expected to disappear within the next 100 years. One factor contributing to their decline is climate change, which causes elevated ocean and beach temperatures. This is a double whammy for species who live in the ocean and lay their nest in the beaches. Already, the impacts of climate change mean that hatchlings are emerging from nests in a state of heat exhaustion/shock, succumbing to opportunistic infections, and displaying physical abnormalities. There is an urgent need to characterize the impact of elevated beach temperatures, identify key areas for intervention, and develop protocols to successfully care for leatherback sea turtles.

Efforts are underway to characterize and confirm changes in leatherback sea turtle hatchlings associated with elevated temperature. In this project, Dr. Miller's (UT) and Wyneken's (Florida Atlantic University) research teams have been taking measurements of hatchlings focusing on intestinal tract abnormalities (which affect their nutrition) and skin microbiota (which impact their ability to fight off infections). The team is trying to understand how these factors are impacted by climate change and how they alter the hatchling's ability to survive.

Photo courtesy of NOAA Fisheries

PhD graduate student Samantha Kuschke takes measurements of a leatherback hatchling.

The team is composed of members representing multiple institutions, NGOs, state and federal agencies, and private industry. The expertise includes biologists, pathologists, nutritionists, engineers, mathematicians, modelers, and an ever-growing list of disciplines, typifying a One Health approach and enabling them to tackle these issues from all sides. Together, this integrative, One Health approach will provide critical insights and actionable recommendations for conservation efforts to preserve this species, and hopefully halt the demise of the quickly disappearing western population of leatherback sea turtles.

Hand in hand with this One Health approach to tackling this wicked problem, the PIs are dedicated to using this study as a One Health training platform. This was initiated over 20 years ago when Drs Miller (a veterinary pathologist) and Wyneken (a biologist) forged their research collaboration and began pairing veterinary students with biology graduate students and placing them within multidisciplinary teams. In doing so, students learn first-hand what each discipline brings to the table and how this multidisciplinary approach yields much better results than any discipline would yield on its own. The result has been a seamless transition from training to functioning as the future leaders and members of multidisciplinary teams.

Chronic Wasting Disease: UT Response and Working Group Update

Investigators: Shigetoshi Eda and Allan Houston

Chronic wasting disease (CWD) is one of the Transmissible Spongiform Encephalopathies (TSE), a category of diseases affecting the brain that includes mad cow disease in cattle and scrapie in sheep. Like the other TSEs, CWD is believed to be caused by an abnormally folded protein, or prion. CWD causes various progressive neurologic symptoms in infected animals (deer, elk, and moose) and is always fatal. The first case of CWD was found in Colorado in 1967; it has since spread to 27 states, four Canadian provinces, and reindeer herds in Norway, Finland, and Sweden, as well as a small number of imported cases in South Korea.

Since the discovery of CWD in west Tennessee, the disease has spread despite intensive efforts by the Tennessee Wildlife Resources Agency (TWRA). In December of last year, a CWD-positive deer was found in Weakley County, making it the 13th CWD-positive county in Tennessee. Scientists at UT have projected the economic loss due to CWD could reach $100M and may lead to the loss of 1,500 jobs.

Recognizing the severe impact of CWD on our state and beyond, UT AgResearch and the One Health Initiative jointly formed the CWD Working Group in 2021. The group is

comprised of nearly 30 UT scientists in the fields of wildlife health and biology, human dimensions, communications, brain science, soil science, mathematical modeling, diagnosis, and sensor technology. One important asset of the group is the 18,400-acre Ames AgResearch and Education Center—located in the middle of the outbreak—which will allow large-scale research in a real-world situation. The working group's core members meet regularly, have an External Advisory Committee, and have prepared a three-year roadmap to develop strategies to effectively address the problem through research, training, and outreach, all while working closely with TWRA. Three multidisciplinary groups are actively conducting research on CWD from the aspects of early detection of the prion and its environmental distribution, epidemiology, human dimensions, and economic analysis.

Photo courtesy of Aaron Burden

Strengthening Interdisciplinary Teams Through Polyvagal Theory and Team Science

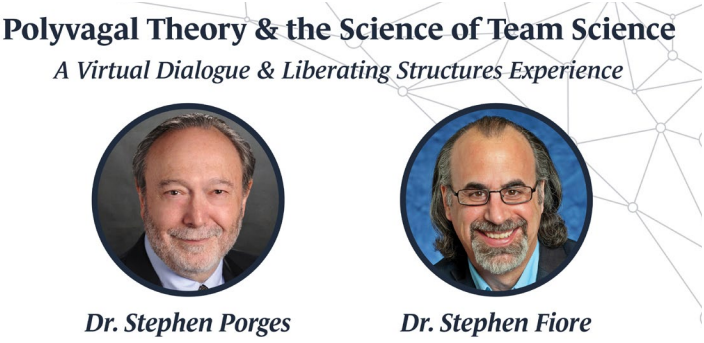
Elizabeth Strand

OHI is dedicated to "Uniting disciplines to protect and promote health for all life on Earth." But disciplines are inherently divergent, making the act of uniting disciplines hard work. They have goals and interests in addressing complex societal problems that can be in competition with each other. There are also cultural differences between disciplines that can impact the way we work together.

That is why OHI and the National Institute for Mathematical and Biological Synthesis (NIMBioS) hosted a virtual event dedicated to the topic of building "High Functioning Teams and Breakthrough Solutions to the World's Wicked Problems." The key goal of the event was to increase an understanding of emotion and collaborative cognition from the perspectives of Polyvagal Theory and the Science of Team Science.

What's Polyvagal Theory, you ask? It is an approach to understanding and regulating the neurophysiology of human connection. Think of your last experience on an interdisciplinary team. Did you notice moments when things seemed competitive? Or when people were sort of shut down and not sharing their ideas? Or maybe even moments when everyone was enjoying themselves and freely sharing ideas, disagreeing as well as brainstorming? These experiences can be explained very parsimoniously by polyvagal theory. In fact, polyvagal theory has a unifying component that crosses all disciplines and even other life forms on earth—the presence of an autonomic nervous system (ANS). We all share it! The state of the ANS can result in cooperation if environmental factors seem "safe" and competition or even shut down if environment factors seem threatening.

We were joined by Dr. Stephen Porges and Dr. Stephen Fiore, giants in the fields of psychiatry and team science respectively, in this virtual, half-day event. We had attendees from many internal and external units, and the event was sponsored by the UT Oak Ridge Innovation Institute, the Bredesen Center, and the Office of Research, Innovation, and Economic Development. If you missed it, never to worry, OHI and NIMBioS are making a free open access short course to share these ideas within UT and beyond so we can all unite disciplines to protect and promote health for all life on earth!



One Health in the News

- **The Next Virus "Hotspot", the Arctic: Why a One Health Response Is Needed**
  Bacteria and viruses can survive for millions of years in very cold environments, like the Arctic and Antarctic Circles. Increasing temperatures due to climate change result in the thawing of permafrost, or frozen earth, from which these pathogens can emerge. A viral "hotspot" can erupt at any time, so One Health-focused prevention and containment efforts are crucial.

- **We're Recycling Potato Skins to Make Prebiotics: Here's Why That's Good for Your Gut—and the Planet**
  Prebiotics are nutrients that boost the growth of beneficial bacteria in the human gut, which enhances overall digestive health and supports the immune system. Most prebiotics are produced commercially, but several industries are shifting focus to synthesize nutrients sustainably by using microorganisms that grow on food industry waste.

- **How Pet Cancer Data Sheds Light on Human Cancers and Speeds the Development of New Treatments**
  "I learned long ago that companion animals can teach us an enormous amount about how to prevent and treat cancer in people" writes Dr. Rodney Lee Page, a DVM who has been researching cancer in dogs for over 40 years. Because of the biological similarities and shared habitats of cats, dogs, and people, researchers can use pet data to discover biomedical innovations that can benefit your pets as well as you.

- **Parasitic Infections Likely to Spread in 2022, CAPC Warns**
  The Companion Animal Parasite Council predicts a more widespread distribution of heartworm and Lyme disease and worsening parasitic conditions for pets across the United States. Risks have increased due to rehoming of pets, changes in wildlife and vector populations, changes in habitat, and climatic changes.

- **UN Environment Programme Joins Alliance to Implement One Health Approach**
  Work to tackle the challenges of human, animal, and ecosystem health using a more integrated approach has seen significant progress in the past year, leaders of three international organizations cooperating across these sectors said, as they expanded their group to include a fourth body, the UN Environment Programme.

One Health Opportunities

One Health Student Leadership Summit Coming This Winter

Mariah Dee and Samantha Kuschke

With persistent health threats such as pandemics, climate change, mental illness, antimicrobial resistance, and wildlife trafficking, there is a considerable need to approach complicated health issues through a One Health lens. A student leadership summit is being planned that will bring together participants from various health disciplines and foster growth in and between the health leaders of tomorrow. This two-day One Health leadership summit will allow students to better develop the soft skills that are so desperately needed in the next era of health leaders and will challenge them to connect their discipline to others.

This summit will be built on a pre-existing leadership development framework (inspired by Hugh O'Brian Youth Leadership conferences) and will end on a community-level call to action. Participants will go through a progression-by-scale development process, which will begin with introspection and ultimately merge what they learn in the sessions with team-based initiatives.

Participants will develop crucial skills such as leadership style flexing, conflict mediation, and cultural humility to apply in their own communities. Perhaps most importantly, participants will be inspired recruit new positions and roles in the future and make more room at the table for all health disciplines and concerned parties.

More information will be released in the coming months as well as updates on the OHI website. If you have direct questions or wish to support this event, please contact Mariah Dee: mfarring@vols.utk.edu.

Hiring Organization	Position
BeVera	Health Communications Specialist
Brazoria County	Epidemiological Investigator
Carnegie Institution for Science Department of Global Ecology	Postdoctoral Scholar: Sustainable Agriculture and Climate Change
EcoHealth Alliance	Communications and Public Relations Coordinator
EcoHealth Alliance	Infectious Disease Epidemiology Research Scientist
The Ohio State University	Open Faculty Search: One Health
Woods Hole Oceanographic Institution	Postdoctoral Investigator
Woodwell Climate Research Center	Research Scientist: Soil Carbon

One Health Events

In November of 2021, faculty from Agriculture, Food, and Environment from Hebrew University in Jerusalem, Medicine at Tel Aviv University, and from various units of the University of Tennessee participated in a One Health workshop sponsored by the UT One Health Initiative and the Center for Global Engagement. This half-day workshop featured research presentations, breakout sessions on collaborative interests, and an overview of funding opportunities for Israeli and US scholars working in the domain of One Health. Since the workshop, participants have continued to hold discussions to explore possible collaborations.

Be sure you've joined our mailing list so you don't miss information on exciting events like this one!

Bruria Adini

Dept. of Emergency Management and DIssater Medicine, School of Public Health, Faculty of Medicine, **Tel Aviv University**

Gladys Alexandre

Dept. of Biochemistry and Cellular and Molecular Biology, **University of Tennessee**

Anat Amit-Aharon

Dept. of Nursing, School of Health Professions, Faculty of Medicine, **Tel Aviv University**

Benny Chefetz

Dept. of Soil and Water Sciences, Faculty of Agriculture, Food, and Environment, **Hebrew University of Jerusalem**

Ehud Elnekave

Koret School of Veterinary Medicine, Faculty of Agriculture, Food, and Environment, **Hebrew University of Jerusalem**

Sharon Schlesinger

Dept. of Animal Sciences, Faculty of Agriculture, Food, and Environment, **Hebrew University of Jerusalem**

David Talmy

Dept. of Microbiology, **University of Tennessee**

One Health
Lunch & Learn Seminar
April 28, 2022 | 12-1pm EST

Health and Environmental Implications of Plastics

Dr. Theodore Henry
Heriot-Watt University

Zoom: https://tennessee.zoom.us/j/95358653714
Passcode: onehealth

UT Science Forum
April 29, 2022 | 12-1pm EST

UT's One Health Initiative

Dr. Carole Myers
University of Tennessee

Registration: https://tennessee.zoom.us/meeting/register/tJEqdOGvrT4oG92eEfSuOj_OVvYFbOAJse_Q

One Health
Lunch & Learn Seminar
May 26, 2022 | 12-1pm EST

Dr. Gladys Kalema-Zikusoka

Conservation Through Public Health

Zoom: https://tennessee.zoom.us/j/98367581161
Passcode: onehealth

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onehealth.tennessee.edu | onehealth@utk.edu