

# Biological Sciences

AUGUST 2015



EAST TENNESSEE STATE  
UNIVERSITY

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## Faculty Scores Above Average in Grant Awards

Since joining East Tennessee State University as the Vice Provost for Research, I have enjoyed working with the Department of Biological Sciences faculty to enhance and promote their research and scholarly activities. Under the leadership of the previous Chair Dr. Mike Zavada and the current Chair Dr. Joe Bidwell, this department has developed robust research and educational programs whose excellence continues to be recognized by national funding agencies, the College of Arts and Sciences, ETSU and accrediting bodies.

The Department of Biological Sciences has a broad array of research expertise, including: cell and molecular biology, biochemistry, basic and applied ecology, behavior, genetics, physiology, organismal biology, evolutionary biology, quantitative biology and educational research. Collaborative links with the Quillen College of Medicine, the Institute of Computation Research and Data Science, and the Center of Excellence in Paleontology further expand the department's research interests.

The department has an excellent track record of obtaining external support for research and educational activities. Over the last five years, Biological Sciences faculty have submitted 64 grant applications to federal agencies, foundations and local agencies and received 22 awards for a total of \$2.7M. The funding success rate of 34 percent is outstanding, since federal support for research activities has not grown significantly during this period and competition for funding has increased. From 2010-2014, faculty in the department submitted 37 applications to the National Science Foundation (NSF) and received 10 awards for a success rate of 27 percent. This rate is higher than the average success rate of 22 percent for this period for the Directorate of Biological Sciences at NSF and indicates that the research programs in the department are very competitive at the national level.

In 2015, three faculty have received new awards from NSF. Dr. Aruna Kilaru received an award totaling \$679,993 for a research project – “To Elucidate N-acylethanolamine Metabolic Pathway and Its Role In Mediating Dehydration Stress Tolerance In *Physcomitrella Patens*;

Dr. Thomas Jones and Dr. Anna Hiatt received an award for \$299,433 for an education project – “Virtual Biology Lab 2.0: Improving and Implementing an Inquiry-Based Educational Resource;” and Dr. Anna Hiatt will receive an award of \$67,617 as a member of a consortium for an educational project “IUSE-HER: A CEREUS (Consortium Exchanging Research Experiences for Undergraduate Students) Approach to Assessing Ecological Responses to Global Change in the Southern Appalachians.” Congratulations to all. These awards exemplify the commitment of the department to excellence in research and undergraduate education.

The department has a superb record of providing undergraduate and graduate students opportunities to participate in research. In 2014, publications from the faculty included 10 graduate and 5 undergraduate students as co-authors. In addition, in 2015, 13 graduate students participated in the Appalachian Student Research Forum.

Within ETSU, the department has been very successful in obtaining grants from the Research and Development Committee (RDC). Since 2010, Biological Sciences faculty have been awarded 13 Major RDC awards totaling more than \$120,000. These funds allowed faculty to involve undergraduate and graduate students in research activities that generated the preliminary data to support application for NSF grants. Department faculty continue to receive recognition and awards from the College of Arts and Sciences. In 2015, Dr. Cecilia McIntosh received the Faculty Research Award; Dr. Lev Yampolsky received the Faculty Teaching Award and Dr. Cerrone Foster received the Non-Regular Faculty Award.

I look forward to collaborating with the faculty in the coming year to implement the new ETSU Strategic Plan for Research and enhancing the research and scholarly activities of this excellent department.

William R. Duncan, Vice Provost for Research





# An Exciting Summer for Our Department



Joe Bidwell, Chair

Photo: ETSU Photo Lab

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## McIntosh Receives Award

Dr. Cecilia McIntosh has been selected as one of the two 2015 recipients of the Notable Women of ETSU award. This award is presented annually by the Women's Studies Program to honor female faculty whose work has had notable impact on our campus and in our community or region. The awards and colloquium highlight the expertise and accomplishments of women academicians at ETSU; provide a forum for the exchange of ideas, research, and projects generated by women faculty and identify women faculty whose work advances understanding of women and their lives. Dr. McIntosh will be honored at the 14th Annual Notable Women of ETSU Colloquium and reception on Wednesday, November 18, 2015, at 5:00 p.m., in the East Tennessee Room of the D.P. Culp Center.

**H**ello everyone and welcome to the Department of Biological Sciences Summer newsletter!

As you read through the articles in this edition of our newsletter, it will be apparent that the department has had an active summer. Our research programs continue to prosper with a number of faculty receiving either external funding from the National Science Foundation (Drs. Hiatt, Jones and Kilaru) or internal support from the ETSU Research Development Committee (Drs. Jones, Joplin, Moore, Karsai and Stewart). These funds facilitate outstanding research experiences for our undergraduate and graduate students and lead to important peer-reviewed publications. In the area of teaching, our summer courses were well attended this year, with one of the highlights being Dr. Tim McDowell's study abroad program that took a group of students to the Galápagos and Ecuador. We are also very pleased to have accepted a group of excellent students into our newly reconstituted Honors-in-Discipline program.

Our Department of Biological Sciences webpage (<http://www.etsu.edu/cas/biology/>) has undergone further upgrades and now includes a "Giving" link that allows online donations to support undergraduate and graduate student research. Additional donor-supported initiatives include the "ETSU/Biological Sciences Eagle Camera" that will hopefully establish a camera over a local bald eagle nest to provide real-time streaming video of an eagle pair as they raise their young. We welcome further donations to support these programs and I thank all who have given so far in 2015. In the area of faculty recognition, congratulations to Dr. Cecilia McIntosh for being named one of the Notable Women of ETSU for 2015 and to Dr. Fred Alsop for having the Kingsport Chapter of the Tennessee Ornithological Society named after him. These honors speak to the impact that Dr. McIntosh has had on the ETSU community and to Dr. Alsop's years of service in promoting public awareness of birds and birding. Finally, I would like to extend a warm welcome to our new Executive Aide, Ms. Maria Kalis Buchanan, and to our new laboratory technician, Mr. Bill Hiatt. Maria will help keep our main office running smoothly while Bill will primarily provide support for our undergraduate laboratories.

Joe Bidwell, Professor and Chair of Biological Sciences

## Faculty Receive Grants from ETSU Research Development Committee

A number of faculty from the Department of Biological Sciences have received funding from the latest round of the ETSU Research Development Committee (RDC) Major Grants Program. These grants provide a maximum funding amount of \$10,000 and support generating baseline data that can help attract additional external funding. The recipients were:

**Karl Joplin:** Identifying Differential Gene Expression during Developmental Diapause by RNA-Seq using the ETSU Molecular Biology Core Facility Illumina MySeq.

**Thomas Jones:** Spiders on the Clock II: Characterizing Genetic Expression Differences Underlying Circadian Rhythm in Aggression (A Pilot Study).

**Istvan Karsai:** A New Diagnostic Tool and the Chaotic Properties of Balancing.

**Darrell Moore:** Disruption of the Biological Clock in Forager Honey Bees by Sub-Lethal Exposure to Neonicotinoid Pesticides.

# The perfect Balance:

Combining Chaos Theory and Force Plate Analysis to Prevent Neurological Diseases

**W**ith a goal of contributing to the field of preventative medicine, Allison Hilbun is bringing diverse skills and experiences to her research at ETSU. She will earn a Ph.D. in Biomedical Sciences while conducting research that combines traditionally separate academic fields in a creative way. With a bachelor's degree in Physics, she is accustomed to analyzing problems using mathematical processes. Additionally, she earned a master's degree in Kinesiology and Sport Studies and has extensive experience with motion analysis, which is typically used to optimize athletic performance. In her research, Allison is using force plate analysis, which has been almost exclusively used in the Exercise Science field for creating body composition profiles. She hopes that by implementing this device into the research in Biomedical Sciences, she can provide a powerful early diagnostic tool for different maladies including neurological diseases. As she developed an innovative new goal for research and first pursued the degree, she approached Dr. Istvan Karsai, a faculty member in the Department of Biological Sciences. Dr. Karsai displayed an openness to interdisciplinary research and was supportive of her project and her innovative approach. When asked about their collaboration, Dr. Karsai commented, "I always like to support students who have ideas...she was very focused on this and very interested, so I decided I will help to develop her ideas and jump into a new field of research." The research question in its most elemental form, "How do balancing strategies and movements relate to overall human wellness?" led Allison to conduct tests using a force plate, which measures the amount of force being applied when a person makes contact with the plate. During the first stages of testing, the test group was limited to ages 18-60, and Allison screened for eligibility using several physical fitness tests. Participants' height and weight measurements were recorded, and they were asked to list their current medications and any known neurological conditions.

"I always like  
to support  
students who  
have ideas..."

Dr. Istvan Karsai

The test consists of having each participant stand on the force plate on his or her dominant leg in a basic balancing position for 12 seconds. During the 12-second interval, software collects 1,200 separate measurements of force displacement. A variation on the test is conducted in which participants are asked to tie knots in a piece of fabric as they balance for an added stability challenge. The thousands of data points collected are then analyzed and compared to various health factors and participant characteristics. After testing a group of healthy



Allison Hilbun and Jay Hilbun



Dr. Istvan Karsai and Allison Hilbun

participants, Allison is currently limiting the analysis to the correlation between age of participants and the balancing strategies they exhibit. According to Dr. Karsai, “the heavy lifting” comes after the data collection, because the data is very complicated. He stated, “We are developing mathematical tools to study the data sets from different angles; we are able to detect very subtle shifts and differences as people are aging.” Because the research is so unique, Allison is responsible for laying the foundation by beginning with the most basic components and factors for analysis, particularly age correlations. Through her initial analyses using Phase Space plots, Allison has found that younger participants exhibit more chaotic elements in balancing strategies and movements than older individuals. This means that they use isolated, quick movements to stabilize themselves, while older participants exhibit more of a continuous “oscillating eight pattern” when they are actively balancing on one foot. Allison’s tentative theory for the findings attributes the chaotic balance patterns of young participants to energy efficiency, as more dissipative movements are known to conserve the body’s energy. The assumption is that as we age, we develop a more continuous balance pattern to compensate for an increasingly slower reaction time.

Allison is applying Chaos Theory and the methodological approach of

Complexity Science throughout the process, which take into account the patterns of balancing movements and focus on the complexities of chaotic movements. Chaotic movements often seem to be sporadic and random but are intricately connected to various bodily systems and neurological components. In a chaotic environment like the human body, symptoms do not necessarily originate from one source, but many symptoms of neurological diseases may be predicted and prevented by analyzing involuntary movements early on. Considering that classical medical diagnosis is based on existing symptoms after patients are showing signs of illness, Allison wants to apply her research to preventative medicine, which uses predictive diagnostic tools to measure changes in the body before a patient actually experiences any symptoms.

With this approach, Allison and Dr. Karsai have observed that the prevalent patterns in the force data indicate the degree of chaotic components, and these chaotic components have potentially strong connections to diseases affecting our neurological systems. Allison pointed to the fact that certain parts of the brain are responsible for involuntary movements, including balancing, and that small changes to those parts of the brain are known to affect balance long before the patient notices any symptoms of a neurological disease.

Current published research has considered balance from a mathematical perspective to show the correlation between how much a person sways and how unstable they are. Additionally, studies involving ballet dancers have shown that they actually sway more while balancing and have learned to increase the width of their sway as a tool for added stability. In essence, the same wide, continuous movement found in older participants has been adapted and applied by comparatively young athletes.

The next stage of Allison’s research is currently an agreement with a local chiropractic office to use the force plate

balance test with patients during their routine visits and to collaborate with professionals in musculoskeletal health. Allison hopes that it will become an easy diagnostic tool for various health statuses and will eventually be used in medical facilities during routine check-ups as a preventative measure. As the research builds relevance and validity, Allison would like to explore the correlation between balance strategies, mental health status, and chronic pain issues.

She will be presenting her research in a departmental seminar later this semester, and she has submitted a National Institutes of Health proposal. She stated concerning her plans for the future, “I’ve always wanted to be a professor. . .I’m very fond of teaching.” Dr. Karsai expressed, “I am not worried about her. The skill set she is developing is very unique and sought after.” He stated that not many people are able to bridge the gap between Biology and Mathematics, so her qualifications make her invaluable for academic research.

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Brandy Nickels

Republished article from Illuminated Magazine Spring 2015 4/11 page 12-13

See full article here: <http://www.etsu.edu/gradstud/documents/illuminated/spring2015.pdf>

# CRAWL Program Finishes

## *after Four Successful Years*

A major strength of the Department of Biological Sciences is its commitment to undergraduate research. One part of this long-standing tradition has been the CRAWL project which has been operating for the last four years and ended on August 31, 2015. Funded by a grant from the National Science Foundation, the CRAWL (“Collaborative Research on the Arthropod Way of Life”) program was established to provide high quality research experiences in mathematical biology for undergraduate students. Faculty members from the Department of Biological Sciences and the Department of Mathematics and Statistics have been collaborating with one another and have been serving as research mentors. Dr. Darrell Moore (Biology) was the Principal Investigator and Drs. Thomas Jones (Biology), Edith Seier (Math), Karl Joplin (Biology), and Michele Joyner (Math) were the co-Principal Investigators. Students selected as CRAWL participants were placed in long-term (summer plus fall and spring semesters) research projects. Integrated research teams (Math and Biology students together with Math and Biology mentors) tackled significant questions at the interface of the two disciplines. The students were actively involved in all phases of the projects from conception to

completion, including experimental design and data collection/analysis, culminating in presentations at professional meetings and, finally, co-authorships on scientific and mathematical journal publications. At last count, we have published five professional journal articles with CRAWL undergraduates as co-authors. Another manuscript has been submitted for publication and several more are in various stages of preparation. CRAWL students also have made 30 presentations at professional scientific and mathematical meetings. Four of our graduates are now in Ph.D. programs and another has taken a position in industry. Several others are still in their undergraduate programs and plan to apply to Ph.D. programs, work in industry, or become teachers. The CRAWL projects covered a wide range of biological/mathematical areas but with the common theme of addressing questions within the broad field of animal behavior. We used three different arthropod model systems -- social spiders, flesh flies, and honey bees. Most of our studies were concerned with spatial distributions of organisms or with changes in behavior that take place over time. This common focus, as well as the sharing of analytical approaches that were applicable to more than one system, allowed a free flow of ideas among the groups.

**Spiders.** CRAWLers in the spider group were concerned with the spatiotemporal dynamics of cooperative foraging in a social spider. Spiders in communal webs position themselves differently at different times of the day and researchers in this group are interested in how this redistribution relates to optimal foraging strategies.

**Flesh flies.** CRAWLers in the fly group were interested in the development of aggressive behavior with age in male flesh flies. Aggression occurs at very low levels just after adult emergence but achieves full potential as the flies reach the age of sexual maturity. Surprisingly, these changes are accompanied by an overall reorganization of the behavioral repertoire. Based on the results, the flesh fly appears to be a valuable comparative model species for the study of aggression.

**Honey bees.** CRAWLers in the bee group were concerned with figuring out how honey bees determine the location of the so-called “dance floor” in the colony. The dance floor is a fairly restricted area of comb where the famous ‘waggle dance’ occurs (the signal used by foragers to communicate direction and distance to a profitable food source). So far, it appears that several different factors are used simultaneously by the bees to establish the location of the dance floor.

**Our CRAWL scholars:** Adam White, Anthony Lundy, Ross Yost, Chelsea Corrigan, Chelsea Ross, Colton Watts, Elijah Laws, Dylan Shropshire, Alex Quijano, Alyssa Williams, Galen Reyes, Nathaniel Hancock, Michael Largent, David Elliott, and Adam Chase

**CRAWL volunteers:** Ashley Wagner, Jordan Brison, Peter Suich, and Trevor Welch

### *Final Thoughts on CRAWL*

From the mentors’ viewpoint, aside from having our undergraduate students as co-authors on publications, perhaps the most satisfying outcome from CRAWL has been the amazing transformation of the students. They began as traditional classwork-centered undergraduates but, after immersion in the projects, they developed rapidly into inquisitive, insightful researchers. Before we knew it, they had become our trusted colleagues. submitted by Darrell Moore



Alex Quijano and Nathaniel Hancock collecting data for the spider project. *Photo courtesy of Dr. Thomas Jones.*



Dr. Jones and Dr. Joyner with students. *Photo courtesy of Dr. Edith Seier*



Clockwise from far left: Dr. Seier, Chelsea Corrigan, Dr. Joyner, Alyssa Williams, Galen Reyes, and Ashley Wagner discussing why honey bees are so complicated. *Photo courtesy of Dr. Darrell Moore.*



Back row; left to right:  
Dr. Dharendra Kumar, Vijay Tiwari,  
Dr. Aruna Kilaru, Sangam Kandel, Dr. Cecilia McIntosh,  
Timothy Audam, Preethi Sathanantham,  
and Kathleen King.

Front row, left to right:  
Jedaidah Chilufya, Mahbubur Rahman, Bal Thakuri  
and Abdulkareem Odessina.

# Recognition for ETSU Department Biologists at PSNA's Conference

**M**embers of our Biological Sciences Department and their graduate students attended the 54th Annual Meeting of the Phytochemical Society of North America's (PSNA) conference in Urbana-Champaign, Illinois. Dr. Cecilia A. McIntosh received the PSNA Life Membership Award in recognition of her outstanding support to the organization and goals of the Phytochemical Society of North America. Dr. Dharendra Kumar was elected as Treasurer of PSNA for a three-year term; Kathleen King, Undergraduate from Dr. McIntosh's lab received an Outstanding Poster Award; and all graduate students received Travel Awards from PSNA. Congratulations to all for their hard work, commitment and dedication.

The (PSNA) is a nonprofit scientific organization whose mission is to encourage and stimulate research in the chemistry and biochemistry of plant constituents, their effects upon plant and animal physiology and pathology, and their industrial importance and utilization. PSNA meetings provide participants with exposure to the cutting-edge research of prominent international scientists.

Additional information can be found on its website at [www.pсна-online.org](http://www.pсна-online.org) or <http://conferences.illinois.edu/psna/index.html>.

## Ornithological Society Chapter Honors **Dr. Fred Alsop**

**B**irding Kingsport, the Fred J. Alsop, III chapter of the Tennessee Ornithological Society was recently organized. The Tennessee Ornithological Society, founded in 1915, is the oldest conservation organization in the state of Tennessee. The purpose of this organization is to promote public awareness of birds, nature, and conservation issues through the study of birds, primarily in the greater Kingsport area, and through projects aimed to conserve bird populations. The organization is named in honor of Dr. Fred J. Alsop, III, Professor of Biological Sciences at ETSU. Dr. Alsop has taught Ornithology and other Biological Sciences at the Kingsport University Center and at the main campus of ETSU since 1972. During his career, Dr. Alsop has led his students to begin the life-long enjoyment of bird watching in addition to teaching the science of ornithology. Dr. Alsop offered guidance and invaluable input to the formation of the Kingsport Birding Trail.



He is also the author of many books and publications including, *The Smithsonian Handbook: Birds of North America*, *Birds of the Smokies*, as well as several other regional books on birds. Also considered was Dr. Alsop's contributions to conservation having been recognized in 2011 by the Tennessee Wildlife Foundation with the Z. Cartter Patten Award as a leading

advocate for the conservation of birds and bird habitat in Tennessee. Dr. Alsop has trained and encouraged countless biologists and citizens to preserve our natural heritage, fostering an appreciation for our year-round resident bird species and the neo-tropical migrants that come to Tennessee from Central America, Mexico and South America to reproduce.



# HONORS PROGRAM COMMENCES AGAIN

<http://www.etsu.edu/cas/biology/academics/hid.php>

**B**y popular demand of the faculty and Dr. Joe Bidwell, the Honors-in-Discipline program in Biology is BACK at ETSU! The new curriculum for the program was designed by our department Honors Committee, approved by the faculty, and then approved by the ETSU Honors College and the campus-wide Academic Council (May 2015). The Honors Committee is now a standing committee in the department, and currently includes Drs. Aruna Kilaru, Darrel Moore, Lev Yampolsky, and Rebecca Pyles, who also is serving as the Biology Honors Coordinator. The required curriculum includes Honors Launch I and II to help our new freshman scholars jump-start their academic careers. Later in the program, students will take Honors Seminar, Research Orientation, their choice of honors-enriched biology courses, Research in Biology, and Honors Thesis. More information can be found at <http://www.etsu.edu/cas/biology/academics/hid.php>.

Although approval of the program came late in the year, we have been successful in recruiting six incoming freshmen and one current ETSU junior. Later in the fall 2015 semester, applications from current ETSU sophomores (biology standing) will be accepted and reviewed, with an additional six or seven students selected.

We plan to continue adding seven or eight new freshmen to the program each year, and hope to maintain a total program size of 30-35 students. We are pleased to welcome our new Honors scholars for Fall 2015! These students submitted their own biographies and their favorite photos from home to introduce themselves, and have given permission for use in this newsletter and on our website. Thanks to: Lea Ann Cutshall, Johnson City, TN; Amber Hanson, born in Okinawa, Japan, from Gallatin, TN; Laura Moffatt, Maryville, TN; Cheril Patel, born in India, from Church Hill, TN; Charlotte Leonie Kaester, Gailingen, Germany; Taryn Clark, East Tennessee; Hayley Seaton, Parsons, TN - WELCOME TO ETSU BIOLOGY!

submitted by Rebecca Pyles



**Lea Ann Cutshall**

I am from Johnson City, Tennessee, and I have lived here my whole life. My family raised me on the values of being the best version of myself and exceeding through my personal goals. So at a young age I started to play multiple sports along with attending school. As I got older I found my interest in medical education and also soccer. Toward the end of my high school career I found out that I want to be a veterinarian and also that I wanted to play soccer longer than high school allowed. So at ETSU, I will be setting my goals high for my education and my physical abilities and I am sure that ETSU provides the best environment for both of these goals to be achieved.



**Amber Hanson**

I was born in Okinawa, Japan, to a military family and spent my life moving from place to place. I graduated from Station Camp High School in Gallatin, TN. I've participated in various activities, including honor societies, musicals, and math competitions. I was also a member of my school's marching and concert band as a French horn and Mellophone player. After I graduate I plan on pursuing further degrees and a career involving genetics.



**Laura Moffatt**

I'm from East Tennessee, born and raised in Maryville, just south of Knoxville. I am a major bookworm, having read more books than I can count or even remember. When I am not reading, I can usually be found watching anime; listening to my music, which is mostly comprised of country (though I do dabble in other genres); and, if I am in the right mood, sitting quietly as I contemplate the mysteries of the universe and our own existence in the universe. I also love watching movies, especially Disney movies. From a very young age, I have always had a love of animals and nature. Animal Planet was one of my favorite channels, and I can watch the entire "Planet Earth" documentary without getting bored (I have the entire set). I took every biology class available in high school, so there was no question in my mind about applying for the Honors in Biology program. I don't have an exact idea for what career I want, but I am imagining myself working in a conservation area or doing research and studies out in the field.

## *cont. HONORS PROGRAM COMMENCES AGAIN*



**Taryn Clark**

I was born and raised in East Tennessee and have two siblings. Both of my siblings have jobs and responsibilities and that leaves only myself, the youngest, to fly the coop. My developing love for biology, photography, and various crafts have influenced my choice to pursue studies in Biology. In school I've always worked to earn A's and B's and to be involved in clubs such as HOSA, BETA, NAC, and Yearbook. I became part of my school's yearbook class/club as a sophomore. The people I met there allowed me to combine ideas and solve issues to create the best product. BETA was also a favorite club because the members loved to volunteer and be a part of the community. My senior year I decided to undertake dual-enrollment classes to earn college credit before graduating, which put me ahead and gave me some experience. I've always expected myself to work. I began babysitting during the summer after 7th grade, and a few summers later, spent my time serving food at a family-oriented park. During my senior year I worked at a grocery store part time and then landed a full-time internship for the following summer. I learned about caring for children, following food protocol and how to contribute in a business environment from my work. I enjoyed my learning experiences from the people I met at school and work. I hope to one day find a way to use my love for genetics and biology to improve the quality of life for others. Being part of an Honors program is a great way for me to become involved as soon as I go to college and I look forward to conducting research with talented students and mentors.



**Hayley Seaton**

Beginning Fall 2015, I will be a freshman at East Tennessee State University, majoring in Biology with a Biochemistry concentration. I grew up in the rural area of Parsons, TN, which recently got a second red light and a McDonald's. To say the least, Johnson City will be a totally different environment for me. I have amazing parents that support me and my decisions, even moving seven hours away from them. I am the oldest child in my family with only one brother. In my spare time, I volunteer with many organizations that help the community. I was very lucky in high school to volunteer with the American Red Cross, American Cancer Society, Carl Perkins Center of Child Abuse Prevention, and St. Jude Children's Research Hospital. I also wish to travel the world someday. So far, I have been to many states and Belize, Central America. I plan to broaden my travel experience as soon as I am able. When I travel, I want to serve small countries and rural areas with my Biology degree and a hopeful degree in Medicine. I grew up in a family full of health care professionals, which intrigued me and sparked my aspiration to do something great in my life. I aspire to be the first doctor in my family. However, I chose Biology as a major for a different reason. I've always been interested in science, but my passion for Biology started my freshman year of high school. Call me crazy, but studying Punnett squares excited my interest, leading to Genetics being my favorite field in Biology. I'm excited to be a part of the Honors in Biology program at ETSU. I can't wait to be challenged and to see what the future holds!



**Charlotte Leonie Kaestner**

I grew up in Gailingen, Germany – a small town in the south of Germany near the northern border of Switzerland. Having a father who is a well-respected medical doctor that started his own private practice, and a mother who is an upper-level Biology and Chemistry high school teacher, it was no surprise that I developed a passion for science and medicine at a young age. Watching my father take care of the people in our town made me realize that being a doctor is more than just treating patients, it is helping and making a difference in patients' lives. The thought of helping people with science formed my aspiration to become a physician. In my free time, I enjoy reading and participating in different activities, such as playing flute for my high school orchestra and being a member of our town's tennis team. But my real passion, besides science, is dance. I took my first dance lesson at the age of four and started ballet two years later. Dancing is my personal safe haven because it frees my mind from stress and worries. During breaks from school, I also had the privilege to travel with my family to 12 different countries, mostly in Europe and North Africa. Seeing different cultures and various lifestyles at a young age helped me become an open-minded person. My desire to visit more countries led me to apply for the Au Pair program in the United States after high school graduation. I cared for the children of an American host family in Maryland and took a few college classes. After experiencing college life and seeing the academic opportunities in the medical field, I applied to ETSU to study biochemistry. I'm the first person in my family to study in a foreign country. However, I stay in close contact with my parents in Germany and travel home every winter break. I hope the HID biology program at ETSU will help prepare me for medical school while still being able to travel the world.



**Cheril Patel**

Growing up I experienced living in many different places including India, Canada, and Florida. New Hampshire, and Mississippi before finally settling down in Church Hill, Tennessee. I attended Volunteer High School and joined Beta Club and Mu Alpha Theta. I also played soccer and ran track and cross country as a Falcon for high school. My two favorite memories from high school involve track. The first would be breaking a 30-year-old school record with my relay team and the other is earning all-conference two years in row. My hobbies included being active and traveling. I loved meeting different people and experience activities that only a certain region can provide during my childhood and that affection has carried on to the present. I also enjoy being physically active through sports; there isn't a greater feeling than relieving stress through running. I had already decided that I was going to be attending East Tennessee State University since my junior year. This was decided because I wanted a great quality education and I also wanted to stay close to home. I'm majoring in Biology because of some childhood curiosities. As a child I was always fascinated by learning new things and later in life I discovered that I enjoyed unravelling the complex processes that happen in nature. I'm excited to see where the next four years at ETSU will take me. I already know it will be challenging with lots of studying however I still plan to have lots of fun and make great lifelong friends. I hope that these next four years will be even better than the fun times I had the past four. My goal after getting a bachelor's degree is to attend med school to be a doctor. Specifically I have no idea which profession I want to go into but it'll come to me sooner or later.



# Summer Travels to Galápagos & Ecuador

The Department of Biological Sciences offered a new ETSU Study Abroad course this summer entitled “The Evolution of Biodiversity in Ecuador & Galápagos.” Drs. Tim McDowell and Tom Laughlin led 10 undergraduate students (mostly biology majors) on a 3-week field course. Students observed diverse habitats and viewed the fabulous flora and fauna in rainforests, cloud forests and alpine páramo in the Andes and Amazonian regions of mainland Ecuador. The highlight of the trip was a week-long boat tour of the Galápagos Islands. The Galápagos tour included visits to 11 islands, from Genovesa in the north to Floreana in the south. Days were full with walks along trails full of the most curious birds and reptiles; swims at beaches loaded with sea lions, and snorkeling trips through clear waters rich in colorful reef fishes, sea turtles, and sharks. Unusual sightings included a short-eared owl, a Galápagos penguin swimming underwater, and a Hood Racer snake constricting and eating a lava lizard. They enjoyed abundant views of the birds, such as Boobies (3 species), Frigatebirds, Pelicans, Albatross, Gulls, Hawk, Flamingos, and many species of Mockingbirds and Darwin’s Finches. The marine and land iguanas and lava lizards, with forms/taxa distinct to each island, were fascinating in appearance and behavior. The sea lions were

endlessly amusing; barking, nursing and stretching on the beaches and lounging about on the rocks or frolicking around as the students snorkeled. What sets Galápagos apart from other rich nature experiences is how the animals are fearless of humans, and are easily met within a few feet of distance.

The rugged, exposed nature of the landscapes and the obvious geological evolution of the islands – from fresh lava flows and crags of young islands to eroded soils and richer vegetation of older islands – was very impressive. Prior to the trip the students read *The Galápagos: a Natural History* by Henry Nicholls (2014), and completed an extensive written exam on the excellent background material therein. Students also kept journals of their daily biological adventures. Students were given a set of current research articles on evolution of Galápagos and mainland plant and animal groups, and they discussed these in several sessions during the trip. Travels before and after the Galápagos were also rewarding. On a day-trip to the Mindo cloud forest, students hiked along a mountainous trail leading to five waterfalls, with vegetation reflecting the abundant rainfall. In Puyo, Amazonian Ecuador, students visited ethnobotanical gardens displaying medicinal and artisanal plants of native tribes (Shuar, Waorani), and rich forests, some very old, others recently reforested with remarkable

success. During the final destination, Otavalo, everyone hiked the rim of a caldera lake at 13,000’ elevation, and observed an indigenous Quichua festival of the summer solstice. Apart from biology content, the trip gave students a broad view of Ecuadorian culture; from the churches and government buildings of Quito’s historic city center on our second day, to the overflowing artisanal markets of Otavalo on our second to last day. For many of the 10 students this was their first international travel, and a few had never been on an airplane. The trip was a rewarding experience for all.

We plan to offer this course again in summer 2017. In 2016 Dr. McDowell will offer his Tropical Botany in Ecuador course, a five-week tour across mainland Ecuador. That course is conducted in tandem with another ETSU Study Abroad course, Spanish Language in Ecuador, which is taught by Dr. Jerome Mwinyelle. For more information on the Ecuador Summer Courses please contact Dr. Tim McDowell, [mcdowell@etsu.edu](mailto:mcdowell@etsu.edu).

submitted by Tim McDowell



A morning trip to snorkel around Kicker Rock, near San Cristobal Island. (Photo: Tim McDowell)



Our guide to the Galápagos National Park, Milton Ulloa, describing the Opuntia tree cacti on Española Island. (Photo: Theresa McGarry)



A morning trip to snorkel around Kicker Rock, near San Cristobal Island. (Photo: Tim McDowell)



ETSU biology students and sea lions on the beach of Santa Fe Island. (Photo: Theresa McGarry)



At Omaere Ethnobotanical Garden, Puyo, Ecuador, our guide Chris Canaday demonstrates traditional use of plant pigments. (Photo: Theresa McGarry)

# Joining the Department



Maria with her four daughters, Maggie, Ginger, Joan and Marley

Maria Kalis Buchanan joins us as the new Executive Aide for our department. Maria was raised in Northern California and growing up, she worked for her father's Airline Catering business. She also worked for a top commercial real estate company in Fairfield, CA, and a financial marketing company in Napa, CA, prior to moving to Tennessee. She is a devoted mom who spoils her daughters and her adorable dog. She loves going to sporting events and various activities with family and friends.



William Bridger Hiatt

William Bridger Hiatt grew up in south central Nebraska, working as a farm/ranch hand and graduated from Oklahoma State University in 2014 with a B.S. in Agriculture and Natural Resources with a focus on Fire Ecology and Management. Bill is currently working on an M.S. in Forestry online through Mississippi State University. Interests include prescribed fire, fire regimes/history, habitat restoration, wetlands, forestry, and all kinds of weather. Hobbies are fly-fishing, hunting, and hiking. He is a member of the Tennessee Prescribed Fire Council, the Association for Fire Ecology (AFE), and the Society for Range Management (SRM). He is certified as a Fire Practitioner from AFE and a Certified Burn Manager through the Tennessee Division of Forestry.



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