



*Department of Biological Sciences  
East Tennessee State University*

*Newsletter May 2014*

*Photo: Istvan Karsai*



# **Department of Biological Sciences**

## **ETSU**

*Newsletter May 2014*

### *Note from the new chair*

It is a real pleasure to finally be aboard as Chair of Biological Sciences. It is also exciting to be writing this summary for what I hope will become a regular Department of Biological Sciences newsletter. As many know, I accepted the position as Chair in early 2013, but due to commitments to the program I came from at the University of Newcastle, Australia, I requested a delay in start until January 2014. I am indebted to Dr. Darrell Moore and Dr. Dharendra Kumar for their service as interim chairs and to the department as a whole for allowing me that time to complete things in Newcastle. With regard to my background, I am originally from upstate New York and completed my undergraduate degree in biology at Siena College in Albany, NY. From there it was on to graduate school at Virginia Tech for both a Masters and PhD in the area of aquatic ecotoxicology. My time at Virginia Tech included collaborative work with faculty from the ETSU Department of Environmental Health. We made regular trips to Johnson City and Unicoi County in the early 1990's to sample aquatic macroinvertebrates as part of the impact assessment for construction of the new Interstate 26 to Asheville. Those years spent in southwestern Virginia and eastern Tennessee instilled a love for the Southern Appalachians that persists today. The mid to late 1990's included a post-doc and faculty position in Australia before I returned to the US. From 2001 to 2010, I was a faculty member in the Department of Zoology at Oklahoma State University. An opportunity to return to Australia arose in late 2010 and I went to Newcastle to serve as Chair of a new program in Environmental Science and Management. While I was not sure if I would stay in Australia for the remainder of my career, I did plan on being there for longer than three years. However, the chance to return to the Southern Appalachians and help lead Biological Sciences at ETSU was just too good to pass up! So here I am.

My first four months as Chair have flown by and have included our filling both a new tenure-track faculty line and a secretarial position. My own research has also started to take shape with initial projects on the North Fork of the Holston River and some wetlands assessment work planned for this summer. The Department of Biological Sciences stands as one of the most active on campus in terms of undergraduate and graduate teaching, publications produced, and research dollars obtained. I look forward to helping continue that great tradition. As the Spring semester of 2014 draws to a close, I wish everyone a safe and enjoyable summer.

*Joe Bidwell*



## Newsletter May 2014

### *Note from the Dean*

These are exciting yet challenging times for ETSU and the College of Arts and Sciences. The college is in the midst of a university-wide Arts Initiative, which will include the construction of a new Arts facility and the re-introduction of a marching band, and we are seeking to add new degree programs in the arts. We have recently completed extensive renovations of several science research labs in Brown Hall, and we continue to provide research opportunities for students across the college. Our Medical Professions Advisement program is flourishing, and many of those students are majoring in Biology. There are many positives but we have seen decreases in enrollment over the past couple of years, and a continued decline in state support for public universities in Tennessee. These factors have led to a greater emphasis on student recruitment and retention at ETSU. In terms of recruitment, we need make prospective students aware of the wonderful opportunities that are available to them at ETSU.

The Biology Department, in particular, has outstanding faculty who are excellent teachers and well-funded researchers, four of them winning college awards for 2013-14. The department continues to provide research opportunities for students at all levels, and it offers a well-rounded training for students whether they plan to go to graduate school, to medical school, or to positions in industry. Having a sense of belonging is important for student retention, and being a member of a research lab, or part of a cohort of pre-med students or biology majors can provide that. The Biology Department is currently streamlining its advisement and course registration processes and those efforts will also help students stay on track and meet their goal of graduation in a timely manner. I was delighted to welcome Dr. Joe Bidwell as chair of Biology in January and I look forward to seeing the new initiatives that he, the faculty, staff and students in Biology will pursue over the next few years.

*Gordon Anderson*

### *Faculty awards*

Congratulations to our College Award winners!

Dr. Dharendra Kumar for teaching,  
Prof. Darrell More for teaching,  
Prof. Hugh Miller for service,  
Dr. Aruna Kilaru for new faculty award.

### *Voice of graduate students*

I recently attended the Southeastern Ecology and Evolution Conference (SEEC) in March 2014. SEEC is a quickly-growing regional conference that is entirely student run and only allows attendees that are current undergraduates, graduates, and post-docs. The conference allows for poster and oral presentations in a low-stress, high rewards environment. The conference is local and open to all that have interests or research in ecology and evolution in the Southeast and is cheap to attend with a \$25 registration fee. The conference is competitive at undergraduate and graduate levels with awards given for best talks and posters, but this conference is a unique opportunity to present research without the added pressure of presenting to professors and other professionals in one's potential field. It is a great opportunity for getting feedback on one's project and for building confidence and presentation skills. I was the only member in attendance from ETSU amongst large cohorts of students from other regional universities.

The 2014 conference was held at Georgia Southern University, and the 2015 conference will be held at the University of Georgia. I presented an oral presentation of my upcoming thesis defense and found the experience to be highly rewarding as a low-pressure, practice run as I prepared to defend. I met many potential future colleagues and friends in my field at this conference and networked with other scientists local to the Southeast. The conference was immensely fun and informative, and I encourage ETSU to send a larger cohort of students (both graduate and undergraduate) in the future to present research in ecology and evolution. Presentations included pure ecology to mathematical modeling, virology to ungulate studies, as long as some part of the research was ecology or evolutionary biology in nature. ETSU Biology has the ability to be well-known for cutting-edge ecology and evolutionary biology research, and this would be a great (and cheap!) place to start. Further, the conference is hosted by a different regional university every year, so there is the opportunity to bring young scientists from the Southeast region to ETSU's campus as a potential host in the future. More information can be found at <http://seeconference.wordpress.com/>.

*Larry L Bowman, Jr.*



### Featured Faculty Dr. Aruna Kilaru

The Department of Biological Sciences is proud to feature Dr. Aruna Kilaru, recipient of 2013-2014 New Faculty Award from the College of Arts and Sciences. Dr. Kilaru joined us in Fall 2011 as a tenure-track assistant professor and since then has made highly commendable contributions to the progress of our department. She is an excellent role model of a young researcher and educator with a strong will to foster the quality of our University at large.

Dr. Kilaru earned her Ph.D. degree from the University of Louisiana at Lafayette in the area of Plant Physiology and Biochemistry. She came to ETSU after her postdoctoral training at University of North Texas and Michigan State University. Dr. Kilaru's current research focuses on understanding the mechanisms by which plants mediate responses to stress, and regulate oil biosynthesis. Her research has far-reaching implications in developing stress-tolerant and bioenergy rich crops, and has attracted many students to work with her. She currently mentors two doctoral, two masters and six undergraduate students. Besides leading a very active lab here at ETSU, she has a strong international collaborative network and she has been invited speaker in many research labs and conferences in the last 3 years. Dr. Kilaru also teaches upper level biochemistry and her students tremendously appreciate the enthusiasm she brings to class and her caring attitude. Aruna takes genuine interest in the growth of the university as a whole and takes every opportunity to contribute. She currently serves on the College of Arts and Sciences Educational Affairs Committee and also on President's Strategic Research Planning Committee.

*Istvan Karsai*



### Graduating our students

Ashley Wagner finished her Master's degree during the spring 2014 semester. The title of her thesis is "Adaptive Strategies for Foraging and Their Implications for Flower Constancy, or: Do Honey Bees Multitask?" A large portion of her thesis work has been published in the following paper: Wagner AE, Van Nest BN, Hobbs C, Moore D (2013) Persistence, reticence, and the management of multiple time memories by forager honey bees. *Journal of Experimental Biology* 216: 1131-1141.

*Darrell Moore*

### TriBeta Society

The Pi Delta chapter of TriBeta, the national biological honor society, was started at ETSU in 1982. The goals of TriBeta include introducing students to research, giving them more information about available career options as biology majors, volunteering in the community, and fostering a tightly knit group of students who are interested in the biological sciences. TriBeta holds bimonthly meetings with activities such as guest speakers, group discussions, field trips, documentaries, presentations, volunteering, and group building activities.

*Sofiya Azim*



Ashley Wagner



## Newsletter May 2014

### *Richard Sante follows his dreams*



Our graduating MS student, Richard Sante came to ETSU in Spring 2012 from Cameroon. His family in Africa depends mostly on farm products and an aspiration to improve crop growth in his farm and his country drove Richard to study plant biology. Richard joined Dr. Aruna Kilaru's group to investigate the mechanisms by which plants tolerate stress. During the course of his research, Richard discovered the occurrence of 'anandamide', a lipid compound, which was previously reported to occur only in animals, in stress tolerant moss plants. Richard then went on to identify the metabolic pathway of anandamide and developed means to study if anandamide that is unique to moss plants is responsible in mediating stress signals.

Richard is a highly motivated and dedicated student. He received a very competitive Grant-in-aid of Research Award from Sigma-Xi in 2012. He presented his work in the Appalachian Student Research Forum (2012 and 2013) and received first place for his oral presentation in 2013. Richard also received a competitive student travel grant to attend the American Society of Plant Biologist's (ASPB) Annual Meeting in Rhode Island in 2013. Richard was awarded second place for his presentation at the ASPB Southern Section Meeting in 2014. Richard was featured previously in The Graduate School Magazine – Illuminated (Super plants).

Richard plans to pursue doctoral degree in the U.S. and gain more research experience to carry back home to Cameroon where he can help train other students and also contribute to crop improvement. Richard Sante's sincere desire to learn and excel combined with his hard working nature is bound to bring him success and help him realize his dreams. Congratulations Richard!

*Aruna Kilaru*

### *Xiaohui Guo will simulate some more*



Our graduating MS student, Xiaohui Guo was recruited from China. He showed compassionate interest in the life of social animals and environmental and climate change. I decided that I gave him a very hard project to collaborate with me that feed his compassion and also is in the forefront of current research. The main question we attacked is about the survival of any colonies under different environmental factors. To study this question we built a very detailed computer model, where each ant is modeled individually. Their behavior and their physiology is individually described by metabolic equations and stochastic processes. The parameters of these processes are estimated from literature data. The model is implemented into an agent based simulation environment where we follow each ant individually and monitor the fate and flow of every food particle and each joules of energy in the colony. We are calculating colony level measurements such as population size, consumed food and so on to monitor the success of the colonies. After the simulation model is built we asked targeted specific questions about how the colony will perform if for example the climate change will increase temperature in different localities or it affects to the food availability.

Mr Guo research was featured both on the ETSU homepage and also in the journal East Tennesseean [http://www.easttennessean.com/news/are-ants-vulnerable-to-climate-change-1.2860631#.U2UR\\_k7t8G](http://www.easttennessean.com/news/are-ants-vulnerable-to-climate-change-1.2860631#.U2UR_k7t8G)

Mr. Guo has been admitted to a PhD program into one of the best ant lab in the world at Arizona State University Tempe and will work with Professor Jennifer Fewell.

*Istvan Karsai*



## Newsletter May 2014

### Reports from the labs



Seven undergraduate students in Biological Sciences have been monitoring nesting of the American Kestrel, *Falco sparverius*, since February along a 30 mile trail on Interstate 26 running from Sullivan County in the north into Unicoi County in the south. They are continuing part of a research project established in the spring of 1997 by ETSU student Clinton Jenkins that has been monitored every spring since by teams of students. This year's Kestrel Team is composed of Dallas Brooks, Thomas Clay, Tyler Sharp, Jessica Johnson, Dylan Harper, Christy Kendall and Matthew Lee; all are biology majors. Senior Dylan Harper has used the study project for the past two years as material for his Honors Thesis by incorporating a new technique that uses Google Earth to get a "bird's-eye-view" of the boxes and the surrounding landscape to place boxes in the most optimum habitat for this little cavity-nesting falcon. A website that can be shared by the team and with the public has been established using Google Maps and can be accessed using the link Kestrel Trail Map. The team monitors 27 nesting boxes placed on the backs of TDOT signs along the interstate under the mentoring of Dr. Fred J. Alsop III, Professor of Biological Sciences. The field research provides a hands-on experience for the students who will present a term paper on their research at the end of the semester and it provides important data on a raptor whose populations in the eastern United States have been decreasing.

*Fred Alsop*



Every year for more than 40 years now, Dr. Fred Alsop has had an ornithology class in the field every week learning to identify birds by their appearance and by their vocalizations. This year is no exception and ETSU photographer, Charlie Warden (the son of the late John Warden who taught botany in this department for many years until his retirement in 1996) went along with the class to photograph it as it stalked its quarry. This field trip was to nearby Sycamore Shoals State Historic Site in Elizabethton, TN, and the class found 55 species of birds in 3 hours' time. In addition to the weekly lectures and laboratories on birds and their attributes, Alsop believes there is no substitute for learning in the field where one can observe all aspects of the birds' behaviors, habitat associations, abundance and seasons of occurrence. In addition to the class work each student chooses a study plot which they monitor for birds weekly for the entire semester. They culminate their work with oral and written reports of their study plots in a round-table indoor session in late April. The class is rigorous, but a fun learning experience that becomes an experience that for some students will morph into a life-long hobby.

*Fred Alsop*





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### Reports from the labs

#### Moore's Lab

Members of the Moore lab (Ashley Wagner, Chelsea Corrigan, Trevor Welch, Darrell Moore) attended the 10th Annual Meeting of the Southern Appalachian Honeybee Research Consortium, held this year at North Carolina State University in Raleigh on April 5th. The consortium includes bee researchers from UNC Charlotte, UNC Greensboro, Wake Forest, North Carolina State, Virginia Tech, and ETSU. This year, we were joined by researchers from the Army Research Laboratory, Clemson University, and Elon University. The meeting consisted of talks given exclusively by students (undergraduate and graduate) and postdocs. From our lab, Chelsea Corrigan (undergraduate) gave a presentation entitled "The relationship between relative hive entrance position and dance floor location in honey bee observation colonies." This presentation describes some of the work accomplished by the NSF-funded CRAWL program. Co-authors on Chelsea's presentation were Ashley Wagner, Galen Reyes, Alyssa Williams, Michele Joyner, Edith Seier, and Darrell Moore.

Chelsea Corrigan presented her talk "The relationship between relative hive entrance position and dance floor location in honey bee observation colonies" at the ETSU Boland Undergraduate Research Symposium on April 1st.

The following paper was published on April 8th: Moore D, Paquette C, Shropshire JD, Seier E, Joplin KH (2014) Extensive reorganization of behavior accompanies ontogeny of aggression in male flesh flies. PLOS ONE, DOI: 10.1371/journal.pone.0093196. This paper may be viewed online at <http://dx.plos.org/10.1371/journal.pone.0093196> and represents some of the work coming out of our ongoing collaboration with the laboratory of Dr. Karl Joplin in the Dept. of Biological Sciences and with Dr. Edith Seier in the Dept. of Mathematics and Statistics.

Darrell Moore received a Distinguished Teaching Award for the academic year 2013-2014 from the ETSU College of Arts and Sciences.



Darrell Moore

#### Kilaru's Lab

##### Honors & Awards:

-Dr. Aruna Kilaru is the recipient of The College of Arts and Sciences New Faculty Award.

-Dr. Aruna Kilaru was an invited speaker at the International Symposium on Plant Signaling and Behavior, New Delhi, India (March, 2014)

-Dr. Aruna Kilaru was an invited speaker at the Avocado and other Subtropical and Tropical Tree Crops Workshop, International Plant and Animal Genome XXII Conference, San Diego, USA (January, 2014)

-Parker Dabbs (MS) received a highly competitive 2013-14 Grants in Aid of Research Award from Sigma Xi for his project on "Characterization of the role of Avocado WRINKLED1-like in regulating triacylglycerol accumulation."

-Richard Sante (MS) won second place for his presentation on "Occurrence and Implications of Anandamide (a mammalian neurotransmitter) in the Moss, *Physcomitrella patens*," at the 2014 American Society for Plant Biologists Southern Section Meeting at Lexington, KY.

-Parker Dabbs (MS) is the recipient of "2014 Fraley Memorial Research Award" for his work on "Identification of Transcriptional Regulators of Triacylglycerol Biosynthesis in Plants."

-Parker Dabbs (MS) received 2014 ETSU School of Graduate Studies and Graduate Council Student Research Grant to conduct his work on "Identifying Transcriptional Regulators of Triacylglycerol Biosynthesis in Plants."

-Md Mahbubur Rahman (Ph.D.) received 2014 ETSU School of Graduate Studies and Graduate Council Student Research Grant to conduct his work on "Identifying Transcriptional Regulators of Triacylglycerol Biosynthesis in Plants."

-Md Mahbubur Rahman (Ph.D.) was selected as a member of 2014-2015 President's Pride, an honorary service organization unique among student groups at East Tennessee State University.

-Md Mahbubur Rahman (Ph.D.) is the American Society of Plant Biologists Travel Awardee, 2014.

##### Conferences:

-Kilaru A, Sante R\*, Swati S\*, Kinser#, B, Miller C#, Shiva S and Welti R (2014) Fatty acid ethanolamide metabolism influences growth and stress responses. *International Symposium on Plant Signaling and Behavior, New Delhi, India* (Speaker; \* Graduate Student, #Undergraduate Student)

-Kilaru A, Cao X, Sung H\*, Dabbs P\*, Rahman M\*, Mockaitis K and Ohlrogge JB (2014), Developmental profiles of the avocado fruit transcriptome during oil accumulation. *Avocado and other Subtropical and Tropical Tree Crops Workshop, International Plant and Animal Genome XXII Conference, San Diego, USA* (Speaker, W071; \* Graduate Student).



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### Reports from the labs

#### Kilaru's Lab

-Sante R\*, Shiva S, Welti R and Kilaru A (2014) Occurrence and Implications of Anandamide (a mammalian neurotransmitter) in the Moss, *Physcomitrella patens*. *American Society for Plant Biologists Southern Section Meeting*, Lexington, KY (Speaker, \* Graduate Student)

-Rahman M M\*, Sung H\*, Shockey J and Kilaru A (2014) Identification and characterization of DGAT1 and PDAT1 involved in TAG biosynthesis in Avocado. *American Society for Plant Biologists Southern Section Meeting*, Lexington, KY (Poster, \* Graduate Student)

-Swati\*, Sante R\*, Kinser, B#, and Kilaru A (2014) Characterization of anandamide metabolic pathway in moss. *American Society for Plant Biologists Southern Section Meeting*, Lexington, KY (Poster, \* Graduate Student, #Undergraduate Student)

-Dabbs P\*, Haas C# and Kilaru A (2014) Transcriptional regulators of triacylglycerol biosynthesis in nonseed tissues, *American Society for Plant Biologists Southern Section Meeting*, Lexington, KY (Poster, \* Graduate Student, #Undergraduate Student)

-Kinser B# and Kilaru A (2014) Cloning and characterization of a putative fatty acid amide hydrolase gene in moss, *Physcomitrella Patens*. *Honors College: Boland Undergraduate Research Symposium*, East Tennessee State University, Johnson City, TN (Speaker, #Undergraduate Student)

-Dabbs P\* and Kilaru A (2014) Identification and verification of plant transcription factors that play a role in regulating the production of triacylglycerol. *Appalachian Student Research Forum*, East Tennessee State University, Johnson City, TN (Speaker, \* Graduate Student)

-Rahman M M\*, Sung H\*, Campbell A#, Gall E# and Kilaru A (2014) A Characterization of acyltransferases involved in TAG biosynthesis in avocado. *Appalachian Student Research Forum*, East Tennessee State University, Johnson City, TN (Poster, \* Graduate Student, #Undergraduate Student)

-Swati\*, Sante R\*, Kinser, B#, and Kilaru A (2014) Characterization of anandamide metabolic pathway in moss. *Appalachian Student Research Forum*, East Tennessee State University, Johnson City, TN (Poster, \* Graduate Student, #Undergraduate Student)

Aruna Kilaru

#### Karsai's Lab

We had a very productive semester. While I was very busy with organizing and built the new online submission and reviews for the RDC major grants, the lab produced interesting results and we lined up some new work for the summer as well.

With Allison Hilbun we submitted an NIH grant, and RDC major grant and a sigma zi proposal. The first two is still pending. We received a small RDC grant to purchase our equipment and we are very excited to start our new research program called: Developing a new diagnostic tool based on balancing data and complexity science.

We are graduating Xiaohui Guo who did a very complex thesis work on ant colony energetics. He will move to Tempe AZ where he will pursue his PhD degree at ASU.

We are also happy to report that Joseph Kusi who graduated last year is admitted to the Environmental Health Sciences PhD program at ETSU.

This semester we presented 3 papers on conferences:

-Guo X and Karsai I. (2014). An agent based model of the energy and population dynamics: effect of temperature and food fluctuations on ant colony. *ETSU Appalachian Student research Forum*. Johnson City, TN. April 2, 2014.

-Hilbun A. and Karsai I. (2014). Agent based mutual inductance model. *ETSU Appalachian Student research Forum*. Johnson City, TN. April 2, 2014.

-Karsai, I., and Kusi, J. (2014). Phenotypic plasticity and fluctuating asymmetry of leaf morphology of three Quercus (Oak) species in response to environmental factors. *International Symposium on Plant Signaling and Behavior*, 2014 Delhi India. Abstracts p. 56.

Istvan Karsai





## Newsletter May 2014

### Introducing our new secretary

My name is Shannon Harr and I am the new Secretary for Biological Sciences. Prior to coming to ETSU, I was employed by Mountain States Health Alliance for seven years as an Administrative Secretary. After being in the medical field for 20 years, this job imposes a new challenge which I am greeting with open arms.

I am the proud mother of three awesome children (a daughter-in-law) and two grand dogs, one son is a United States Marine stationed in Japan.

Hobbies include tole painting, cross stitching, quilting, helping others and motorcycle riding

Volunteer activities include: Girl Scouts of the United States of America; as troop leader, council trainer, service unit secretary (including numerous service projects throughout the region), Assistance Resource Ministries, Regional Cancer Center, Interfaith Hospitality Network 2012 recipient of the GSUSA Volunteer of Excellence Award.



Shannon Harr

### Student awards

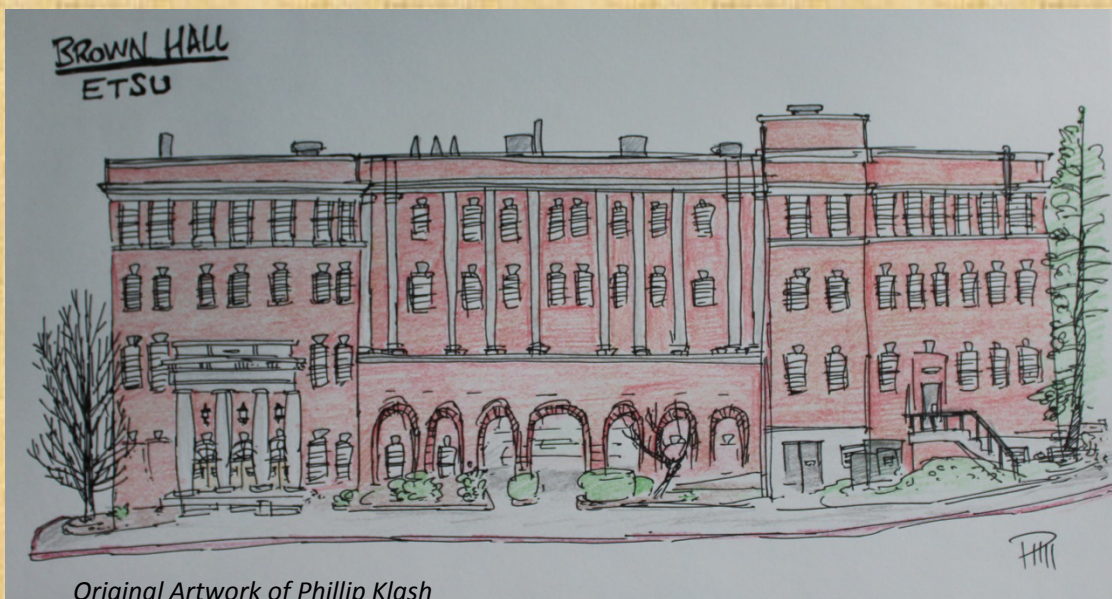
Congratulations for our award winner students!

- J. D. Shropshire ETSU BISC Award for Outstanding Senior
- M. Davenport Herman Odell Award for Outstanding Junior
- B. McCullough Marcia Davis Research Award
- Larry Bowman Dr. Denise Pav Research Award
- Parker Dabbs William Harvey and Nina M. Fraley Award

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