The Perils & Rewards of Research in the Field
Rada Petric & Angie Larsen, UNCG Biology EHS PhD Students

The Kalcounis-Rueppell Lab studies wild bats and rodents. Field research is always exciting, but sometimes the excitement is unexpected (and not in a good way). This year we have been evacuated due to a wildfire and have had a car accident due to a rockslide. In past years we have been robbed, our equipment has been vandalized (by both humans and bears), and we have had a 4-wheeler catch fire while we were driving. Luckily, due to solid emergency plans, amazing first responders, and intense job safety training, we have always been safe and had successful field seasons. Even when things aren’t going as planned; we really enjoy our work because of the interesting questions being asked and the opportunity to work in nature studying wildlife.

One species that we study is the California mouse (Peromyscus californicus - pictured at right). It is one of the few species that is strictly monogamous. They form lifetime pair bonds and share all parental responsibilities. In fact, with the exception of nursing, the male California mouse will perform all of the same parental care behaviors as the female. From previous research in our lab, we know that the California mouse produces ultrasonic calls. However, we do not know all of the functions of these calls. The most common type of calls produced by wild California mice sound a little bit like whistles (even though they are strictly not whistles). These long and linear calls are produced at an average frequency of about 30 kHz (Example 1, below). Interestingly, a similar species called the brush mouse (Peromyscus boylii) has a smaller average body mass (~25 g; compared to the California mouse which is ~ 40g) and also produces the same type of call but at a higher frequency. Smaller bodied organisms often produce higher frequency sounds than their larger relatives.

Ultrasound is defined as any sound above 20 kHz, which is above human hearing range. Higher frequency sounds travel shorter distances than lower frequency sounds, because they attenuate faster and are more susceptible to absorption by the atmosphere and physical structures in the environment. For example, vegetation can absorb sound and therefore be an obstacle of sound propagation. Wild California mice live in areas with dense vegetation cover. This cover is probably preferred for predator avoidance, however it does affect how far their vocalizations travel. Short distance communication, between mice.

Wild mice are known as ecosystem engineers that directly and indirectly influence the abundance and distribution of other species. For example, mice are major prey species for multiple predators such bobcats, foxes, snakes, and raptors. Mice also disperse seeds and mycorrhizal fungi. Studying mice behavior provides an indication to the health of their population and therefore ecosystem health.
Meet Our Staff

Omar Raya - Administrative Support, Front Office

Omar Raya came to UNCG after spending his freshman year at UNC Pembroke. He then transferred to UNCG for the remainder of his college education. Omar graduated Magna Cum Laude in the Spring of 2014. He double majored in Sociology (with a focus on Criminology) and Spanish. Omar first came to the Biology department here at UNCG while working as an undergraduate helping out in our front office. He also worked in Parking Operations here on Campus as an undergraduate. Upon graduation Omar worked as a teacher’s assistant for special needs children. He then returned to the Biology Department in the spring of 2015. Omar is happily married and likes to spend time with his family and friends, enjoys playing with his dogs and also grilling out and playing football in the park in his spare time for fun.
My Time in Phased Retirement

By Robert Cannon (soon to be Emeritus Professor)

Questions that folks often ask me: “Are you still here (at UNCG)? I thought you had retired.”

...“Aren’t you retired yet?”

My answer is that I am presently in Phased Retirement, not simply Retirement. I am sure that you are now asking the question “What is Phased Retirement and how is it different from simply Retirement?”

In Retirement, which starts for me at the end of June 2016, UNCG no longer will be paying me any salary (zero dollars). For these past three years that I have been in Phased Retirement I have been working half time for half my salary. One of the requirements for Phased Retirement is that you give up tenure. And finally, before Phased Retirement begins, a faculty member submits a proposal about what he/she plans to do. The Department Head, Dean, and Provost review and approve the proposal. The goal of Phased Retirement is to give a faculty member a chance to ease somewhat into retirement - to figure it out, while helping the university meet its objectives.

For my Phased Retirement, I proposed that I would teach in the fall semesters and have the spring semesters free to do other things. I continued to teach General Microbiology with Dr. Parke Rublee and Dr. David Battigelli. Fall 2015 was the 43rd fall semester in a row that I have taught Microbiology. The three of us each teach a lab section, and then Dr. Rublee and I split the lectures (Dr. Battigelli gives three lectures on microbial evolution and taxonomy). Also, in the fall semester, I have taught a course for the Honors Program titled “How to Win a Nobel Prize,” and, in fall 2015, "Biology Seminar," which was a one-hour course for junior and senior biology majors on how to find a job and make the most of life after college. In the spring of 2015, I worked with UNCG’s Master of Arts in Liberal Studies program that is in the Division of Continual Learning to develop a six-week online course titled “Science through Nobel Laureates.” If the title looks a bit like the Honors course that I have taught, the MALS course is quite similar though it includes graduate level expectations. I taught the MALS course for eight students in the summer of 2015. I will be teaching the MALS course again in the second half of the spring 2016 semester, but this time I may have 30 students in the class.

One thing that came with Phased Retirement was that I turned over the Chair of the Health Careers Advisory Committee and the Directorship of UNCG’s Post Baccalaureate Premedical Program to one of our Senior Lecturers, Ms. Robin Maxwell. I still talk to students interested in health careers, but I no longer have students assigned to me for advising. For the broader community, I still do a lot of health career advising as coordinator for the Finding an Advisor service of the National Association of Advisors for the Health Professions.

What about spring semesters when I have been “off” from teaching? In spring 2014, the Provost paid me (extra money) to help transition the Health Careers Advisory Committee. For personal interest in spring 2015, I audited a History course on World War I, and now in spring 2016, I am auditing the course on World War II. My friend and former racquetball partner, Dr. Paul Mazgaj, who is also in his third year of phased retirement, teaches both courses.

In the fall of 2013, I trained at The Hospice and Palliative Care of Greensboro (HPCG) to become a Direct Patient Care Volunteer, and since the training I have tried to volunteer at least two hours per week for HPCG. About eight months ago, I switched my volunteering to Beacon Place, which is HPCG’s in-patient facility. I spend two hours there every week talking to patients, talking to family members, and just trying to be helpful (I also usually feed the cats that live outside Beacon Place).

Another activity that continues all year is court mediation. Back in 2002, my wife, Janne, and I trained as community mediators for the Alamance County Dispute Settlement Center (we lived in Alamance County at that time when Janne was on the medical school faculty at UNC-Chapel Hill). Since then, I have continued to volunteer as a mediator for the District Court in Alamance County. I also mediate grievances for the North Carolina Office of State Human Resources. More recently, Janne and I have been mediating disputes between citizens and police officers for the Greensboro Police Department. We call ourselves “Cannon Mediation.”

After getting my hip replaced (due to arthritis), I had to retire from playing racquetball, however, I can still play tennis. My friend and biology colleague, Dr. Paul Steimle, also plays tennis. Last winter, we played indoors at least once a week. In addition, Paul has gotten me involved in playing USTA league tennis, which has been great fun. I play mostly doubles. During the spring, summer, and fall, I

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Symbiosis

Reporting from the University System...Dr. John Lepri
As one of the UNCG Faculty Senate’s Delegates to the UNC-system Faculty Assembly, I meet monthly in Chapel Hill with faculty from all of the UNC-system’s institutions. We take this opportunity to share our successes, to disclose our latest problems, and to compare notes on possible solutions. Like the UNCG Faculty Senate, the Faculty Assembly does not have a “constitutional authority” to control daily operations or budgets on our campuses, but we all express a strong commitment to shared governance. We, the Faculty Assembly, generally feel that the UNC-system’s General Administration (GA) hears what we have to say and that the GA represents us well to the UNC-system’s Board of Governors, who are appointed by the North Carolina Senate and House. The powers and duties of these Board Members encompass nearly every aspect of every academic effort within the UNC system.

I have used this column previously to share news of our Biology Department’s burgeoning enrollment that now strains us to the point of breaking. It looks like we are doing well, but what about everyone else in the system? At the UNC-system Faculty Assembly meeting on Friday, April 17, 2015, we heard from the UNC-system’s Chief Operating Officer, who provided an update on performance in the UNC-system, condensing the most relevant data, as follows. Over a 5-year span:

campus appropriations per student ($10,953 in 2013-2014) have decreased 2%,
tuition receipts per student ($6,712 in 2013-2014) have increased 52%,
degrees awarded (51,575 in 2013-2014) have increased 18%,
state appropriations per degree ($42,819 in 2013-2014) have decreased 14%, and
external funding for research has increased 15% ($1.34 billion in 2013-2014).

At first blush, it looks like the budget reductions imposed on the UNC system by the State Legislature were right on target, something to the tune of “we gave them less money and they performed better than ever, graduating more students, bringing in more research dollars, and supporting our ingenious tradeoff between of lower taxes and program quality. We should keep going with this!” Is this conclusion warranted?

Cigarette smokers can puff away and not feel an immediate negative effect, but we all know that the long-term price smokers will pay is going to be severe, not just for the smoker, but for those they live with and those in their families. Just like that cigarette puff that really “hit the spot,” the budget cuts to the UNC-system might feel good in the short term. But what about the long term?

At all levels, the UNC-system is presently losing some of its best faculty and staff, largely due to the perception that a premier state university system is on its way down. Pay levels for state employees are generally regarded to be stagnant, but the reality is that the actual spending power of state employees is in a sustained multi-year decline. The UNC-system is tracking the increased turnover of its faculty and staff, and occasionally manages to plug one or two holes in a large, leaky dike with a small pot of money. But the dike itself is weakening, and the extent to which North Carolina’s citizens, whether or not they are UNCG Biology Alumni, get involved in restoring the prominence of the system remain to be seen. We need you to help keep the dream alive for future biology majors! Be involved with the decision-makers. Your state legislators truly love to hear from you, and they have promised to serve your best interests.

BIOLOGY DONATION OPPORTUNITIES

Make an impact. Support the Biology department by using our online form and your Visa or MasterCard to make a gift.

http://biology.uncg.edu/gifts/

Help UNCG forge new possibilities for students, faculty, programming and research.
Faculty Spotlight: Dr. Parke Rublee

Microbial ecology is a methods limited discipline primarily because the microbial community consists of very small organisms—hard to see, isolate, and understand. During his career, Dr. Parke Rublee has seen two “revolutions” in methods used to study microorganisms in natural environments. The first was the development of fluorescent staining techniques that allowed microbial ecologists to recognize that there was an order of magnitude more microbes in the environment than had been known before. This improvement microscopy occurred during the 1970’s and the use of these fluorescent stains was an integral part of his early career as he was able to enumerate the bacterial community in water and sediments of marine and freshwater ecosystems. The second revolution was the adaptation of molecular biology methods for use in natural systems. The results of this development have truly been astounding, allowing microbial ecologists to discover the DNA sequence of previously unknown organisms, to begin to understand the microbiomes (microbial community) of plants, humans and other animals, and to provide insight into the metabolic functioning or organisms in their natural setting. This approach is leading to many practical applications for improvement in agriculture, health, and environmental management. Using such methods Dr. Rublee has assayed for the presence of toxic algae in environments worldwide and is currently working to assess microbial responses to environmental contamination. “The field of aquatic ecology has changed dramatically and it has been an exciting – if at times challenging – career focus” he said.

Dr. Rublee received his Ph.D. from North Carolina State University.

Faculty Spotlight: Dr. John Tomkiew Dean

Meiosis is the specialized pair of cell divisions that ensures that eggs and sperm are produced with the correct number of chromosomes. Errors in meiotic division result in chromosome aneuploidies, the most common forms of human genetic syndromes, in which individuals either have one too many or one too few chromosomes. Given its importance to all sexually reproducing organisms, one might expect that the molecular mechanisms involved in meiosis would be highly conserved. On the contrary, numerous variations have evolved between organisms, and in some cases even within a single organism. Female and male fruit flies, for example, have evolved separate pathways for segregating meiotic chromosomes. Females use a “canoncal” pathway involving recombination, or crossing-over, while males lack crossing-over and seem to have evolved a new system for sorting out chromosomes in meiosis. Dr. Tomkiew Dean studies this system in male flies, with the goal of understanding both how and why such a unique system evolved. Using classical and molecular genetic approaches, his lab has identified a number of novel genes involved, as well as genes that have other roles that seem to have been “borrowed” for use in male meiosis. Among these are topos, a fly homolog of a human tumor suppressor, that is required for both chromosome segregation and nuclear shape, and teflon, a gene that appears to be unique to flies and only functions in male meiosis.

In addition to examining the genes involved, the lab is also exploring the how the chromosomes themselves interact in meiosis. It has been known for over a century that homologous chromosomes must find their partner and pair during meiosis, so that one chromosome of each type can be segregated to each gamete. How this pairing occurs is still a mystery. Dr. Tomkiew Dean has developed a new assay to examine the ability of specific sequences to pair, by artificially inserting potential pairing sequences from one chromosome onto another. Direct observations of pairing are made using the confocal microscope to examine which sequences are capable of initiating and maintaining pairing. In combination with the genetic analysis of the genes involved, this new assay offers a promising handle on understanding how chromosomes can identify their partners. The knowledge gained through these studies may have broader implications for how aspects of other pairing-dependent phenomena occur, such as those involved in DNA repair and gene regulation.

Dr. John Tomkiew Dean received his Ph.D. from the University of Washington.
Symbiosis

Department of Biology Graduation Speech - May 7th, 2015
Stan Faeth, Head and Professor of Biology

Today, students, parents and friends celebrate graduation and also pause to thank faculty for all their efforts in teaching and mentoring them. You already given our very dedicated faculty in Biology a round of applause for the fine job they’ve done over the years in teaching and mentoring you. After this formal ceremony, you will go to Sullivan for the reception and you and your parents will again thank our faculty for the excellent college education that has prepared for your life’s next endeavors and challenges.

Now my next question to the audience may sound like a strange one.

Are there any aficionados of the original Twilight Zone here? You know, the old ones hosted by Rod Serling in the 1960’s? In one of my favorites, The Changing of the Guard, a Vermont male prep school professor played by Donald Pleasence is forced into retirement after 50 years of teaching. He frets he has not made any lasting contributions to his students and even contemplates suicide. But, the ghosts of former students reappear to reassure him that he was instrumental into making them into men who died heroically during wartime. He then retires content (and alive) knowing he has made important differences in the lives of his students.

But education is not one-way flow of teaching and learning from the professor to student. Today, I’d like turn this around and tell, you, the students, what you have taught and given to me. I’ve been a professor for 35 years, 7 of these at UNCG and have had the privilege of teaching and interacting with thousands of students. In many ways, I’ve learned as much from all of these students as they did from me.

I’ll start off with a story when I was a young and naïve assistant professor teaching a very large introductory biology class (about the size of this room). During a human genetics lecture, I was discussing human chromosome disorders, such as Down’s Syndrome or Trisomy 21 which many of you may be familiar with. Another much rarer genetic disorder, Turner’s Syndrome, results from a missing X chromosome (one instead of two). I rattled off the textbook description of individuals with Turner’s Syndrome - female in appearance but greatly reduced female secondary characteristics, very short stature, broad and shield-like chest, defective vision and hearing, and usually, mental retardation.

After lecture, a bright, articulate and an attractive young woman stayed until all the other students had departed. You can probably guess what happened next. She disclosed she has Turner’s Syndrome. But she displayed almost none of the textbook traits. And in the end, she did very well in my class, earning an A. Additional conversations with a geneticist colleague better informed me that all human genetic disorders span a very wide range of manifestations, from nearly none at all to severe. The “textbook” descriptions simply do not reflect this variation.

I learned two hard but necessary (and very humbling) lessons from this student. The first was to think beyond the textbook, which was, ironically, the very thing I had always advocated to students. Second, that to pigeonhole or categorize individuals based on genetic traits or physical appearances is short-sighted, and, at worst, hurtful.

Here are just five other examples of many to illustrate what students have taught me:

1. A student named Erik suffered from Duchenne’s muscular dystrophy, a debilitating disease. Erik worked hard but struggled mightily in my introductory biology class. Confined to a wheelchair, Eric supported himself in school by working as an usher at basketball games. He never finished college because his condition worsened. But he earned a “C” in Biology and he was so very
proud of himself (and I of him).

From Eric, I learned what perseverance and courage is really about. I learned how to better appreciate achieving what may seem to be small things or goals in life. I learned that you don’t need to win a Nobel Prize or a national championship to be successful and happy – those common, everyday tasks and interactions with your family, friends and co-workers are the really important ones in life.

2. From many the students at UNCG who I know hold down part-time or full-time jobs to support themselves in school, who have had to overcome difficult family situations or even tragedies, and who may have not had a rigorous high school experience to prepare them well for college, but still are sitting here today awaiting their degrees – I’ve learned how privileged I was when I received my education. You taught me to try to be more patient and understanding when you have sometimes struggled during your journey to your degree today.

3. A student once confided in me that she had been prosecuted for vehicular homicide and had spent 3 years in prison. She recognized that not only had she shattered the lives of her victim’s family but also that of her own family. But she was trying her best to make amends and make something positive of her life. From her, I learned that everyone deserves a second chance in life.

4. Then there was the disruptive student who came to class late and left early, didn’t pay attention when he was there, and performed poorly on tests. I later learned his disruptive behavior was not personally directed at me or the class, but rather reflected his internal strife due to the recent incarceration of his father. From this student, I hope I learned to listen a bit better and not rush to judgment so quickly.

5. From the many students who have been researchers in my lab, I’ve learned many new ideas and fresh perspectives on complex scientific problems. Your enthusiasm and discoveries have always energized and inspired me and provided the foundation of knowledge for the next generation of students.

I began this speech by using the word “privilege”. It has indeed been a privilege to teach and train undergraduate and graduate students at UNCG and throughout my career. It has also been a privilege to learn from you and watch you grow and develop.

Although this aging body may not show it, you have kept me young at heart, in thought, and in spirit.

For that, I am forever in your debt.
My Time in Phased Retirement, (continued from page 3)

have been playing tennis at least three times a week. Another thing that I did prior to my hip
replacement surgery was to work with a trainer to strengthen myself for the recovery process. I have
continued to work with my trainer twice a week. I am a proponent of the idea that staying fit
physically will help keep my brain and nervous system fit as I age.

Another physical and certainly mental activity is golf in the summer and early fall usually with
friend and biology colleague Dr. John Lepri. I’ve taken a few lessons, and recognize that I need to
take more, but we do have fun.

In the spring of 2015, the Department hosted a retirement party for me in the Virginia Dare Room of
the Alumni House. In addition to friends and colleagues who are faculty and staff at UNCG, a
number of former students were in attendance. A few folks said nice things about me.

This year, 2016, I did something that I probably have not done in over 40 years, and that is to play
bridge. I believe that the last time I had played was in the late 1970’s in the Eberhart Building when
there were empty rooms on the 4th floor of the building during my first years as a faculty member.
My bridge partner was a former student. We’ll see how long this continues.

So what will happen once Phased Retirement ends this summer? I still like to teach, so I may be
teaching at UNCG on a course-by-course basis for the Biology Department, the Master of Arts in
Liberal Studies program, and maybe occasionally for the Honors program. I’ll start collecting my
Social Security in the fall. I want to encourage all you hard working Biology alums to keep working
hard to keep the Social Security System solvent.

Over the years, I have enjoyed hearing from former students first by letters and now by emails. I
have been at UNCG long enough to hear students tell me that I taught their parents, and last fall, I
heard “You taught my Grandmother.” I would love to hear how you are doing.

Lots of retired folks have told me that they are busier in retirement than when they were working. I
have been pleased by how busy Phased Retirement has been. I am pretty sure that I am going to find
plenty of enjoyable things to do in retirement. Live Long and Prosper, and May the Force Be with You.