I am delighted to introduce the first edition of Rising Tide, UNE’s magazine for research and scholarly activity. Over the two years I have now been at UNE, I have seen a tremendous change in culture toward research and scholarship – in all of UNE’s wonderful range of disciplines. While later editions of Rising Tide may focus on specific areas of research and scholarship, this first edition has been designed to capture the broad range of interests at UNE.

I come to UNE with a background in international research in environmental health with a focus on water and health. I was also fortunate to serve as principal investigator for the NIH-funded Montana IDeA Networks for Biomedical Research Excellence Program, dedicated to strengthening research infrastructure at Montana’s four-year and tribal colleges. I continue to be funded by the US-EPA to work in Montana with the Crow Reservation community on environmental health priorities, work that I hope can be extended to help focus on health disparities amongst rural populations in Northern New England.

At the same time, UNE’s proximity to the Gulf of Maine allows me to explore a long held interest in oceans and human health, particularly in the area of microbial ecotoxicology (using marine microbes as monitors of ecological health), and source tracking (discovering sources of harmful microbes in our rivers, estuaries and coastal ecosystems).

This has been an exciting time for me and my staff as we have watched UNE’s Center of Excellence program grow from a visionary idea into reality. Our program initially focused on four areas of research and scholarship – marine sciences, neurosciences, public health and global humanities – resulting in formation of the Center for Land Sea Interactions, the Center for Excellence in the Neurosciences, the Center for Community and Public Health and the Center for Global Humanities. It has been my privilege to oversee the early development of each of these centers, made possible by the leadership skills of center directors Phil Yund, Ed Bilsky, Ron Deprez and Anouar Majid, respectively. Although the centers have taken different directions, each contributes to the mission of the University by leading our efforts to build sustainability in research and scholarship – through faculty mentorship, program project development, PhD programs, and through raising the intellectual visibility of UNE throughout the university, local and national communities. Highlights from these centers are included throughout this magazine.
Many of our faculty are active in research and scholarship outside of the Center of Excellence program. In this magazine you will see contributions from almost all departments in UNE’s five colleges – Arts and Sciences, Osteopathic Medicine, Health Professions, Pharmacy and Graduate Studies. It is particularly gratifying to see the level of enthusiasm to pursue scholarship within the humanities at UNE, an area that does not traditionally attract substantial federal funding. We realize that we can build on this enthusiasm through partnerships. This is exemplified to some extent by efforts that centers are making to become inclusive of all disciplines. This is as true for the sciences as it is for the humanities.

As competition for federal dollars increases, funding agencies are beginning to look for programs that are truly interdisciplinary—this is in recognition that real world problems are not solved by a single discipline. Public health, perhaps more than any other field, reflects this trend. The human condition cannot be improved with medicine alone, but needs a combination of social, economic, education, health care, and, in particular, cultural, disciplines working together at the community level.

Looking forward, I see an unparalleled enthusiasm at UNE to build research and scholarship that is both nationally and internationally recognized. Our efforts in areas such as public health and marine sciences target the needs of northern New England, but we are also increasingly thinking globally, with existing and potential partnerships in Ghana, Mexico, Morocco, China, Canada, the UK, and the Caribbean. These partnerships will provide unique training experiences for both our students and faculty, and at the same time open new fields of research and scholarship in both the humanities and the sciences. It’s important to recognize that international opportunities provide a powerful recruiting incentive for both undergraduate and graduate students seeking to broaden their understanding of our global community.

It is exciting to see the enthusiasm that this publication has generated throughout our research and scholarship community. Our intention is to publish our progress and success stories on an annual basis, and we welcome your suggestions for future additions.

It is an honor for me to serve the University of New England in helping to direct our vision for research and scholarship. I see us constantly gaining ground – as a rising tide – and look to this publication as the expression of our efforts, to both the university and to the wider community.

Tim Ford
Vice President for Research
and Dean of Graduate Studies
UNDERGRADUATE RESEARCH ................................................................. 6

Undergraduate Research Offers New Opportunities page 6
Undergraduate research is thriving at UNE. In accordance with its strategic plan, the College of Arts and Sciences has invested significant resources in strengthening and broadening its program of undergraduate research.

Snapshots: NURDS, Stevenson Lab, SPARTACUS

SCHOLARSHIP RESEARCH ............................................................... 8

On Dehumanization page 8
David Smith investigates dehumanization from an interdisciplinary perspective to developed a theory of what goes on in the human mind when we conceive of other people as less than human.

Studying Animal Narratives page 9
Susan McHugh researches the assumption that girls and horses have a natural affinity and uncovers precious few antecedents to Enid Bagnold’s 1935 bestselling novel National Velvet.


MARINE & ENVIRONMENTAL RESEARCH ................................. 13

Tracking the Resident Squirrel page 13
Nick Perlut and students explore squirrel movement patterns and survival to understand how gender and body size affect movement and survival.

Researching the Physiological Ecology of Fish page 14
James Sulikowski’s lab collects data on the life history and physiology of fish in exploring the balance between the needs of an ecosystem and the needs of a fishing industry.

Connecting Past with Present page 15
Michelle Steen-Adams researches how past cultures have influenced the present-day landscape at the Wells NERR.

Understanding and Protecting the Saco River Estuary page 16
Pam Morgan focuses on sustaining the health of the estuary.
Tracking Pelagic Species page 21
Stephan Zeeman studies the distribution and migration of Basking Sharks and Right Whales.

Snapshots: Hawaiian Forest Birds, EPA Lifetime Achievement Award, Land-Sea Interaction, Pinniped Behavior

PUBLIC HEALTH & HEALTH PROFESSIONS RESEARCH ........... 22

Next Generation of Health Services in Maine page 22
OneMaine Health Collaborative works with UNE to explore major trends in the delivery of health services and identify unmet health care needs in Maine.

Junk Food and Beverage Marketing in Schools page 23
Michele Polacsek develops specific recommendations to strengthen legislation in Maine and nationally.

Snapshots: The Maine-Harvard Prevention Research Center, Saco Human Performance Laboratory, The Humanities and Nursing, Immune and Genomic Responses to Resistance Exercises, The FUN Program

BIOMEDICAL & CHEMISTRY RESEARCH ........................................... 26

The Center for Excellence in Neuroscience page 26

Drug Discovery at UNE page 27
Karen L. Houseknecht drives the drug discovery program in the College of Pharmacy.

Extending the Reach of the Limbic Brain page 28
Peter Morgane and David Mokler extend the concept of the limbic system.

Searching for Serotonin page 29
Dr. Mokler’s recent findings show that children who have died of SIDS have lower levels of serotonin in areas of the brain critical for breathing.

From Lab-bench to Bedside page 31
Renee LeClair and Andrew Binks improving “translational” research with a collaborative effort to take their molecular and physiological science to the clinical arena.

Snapshots: College of Pharmacy, Ionic Liquids, The Limbic System and Emotional Learning, Learning by Living Project, Cardiovascular and Metabolic Diseases, Steroid Influence on Sexual Behavior, PDV Seal Neurons, Morgane Musings

RESEARCH ADMINISTRATION .......................................................... 35
Happy to be NURDS

UNE undergraduate and graduate students have established a new annual conference focused on undergraduate research. Aptly named the Northeast Undergraduate Research and Development Symposium (NURDS), the conference is funded by a grant from the National Science Foundation, with Markus Frederich, UNE Associate Professor in Marine Sciences, as the principal investigator. The conference is the only regional science symposium in New England that features undergraduate research.

When the conference was first held in 2009, more than 200 undergraduate students from 39 different colleges and universities attended. Students came from as far south as New Haven, CT, as far west as Burlington, VT and as far north as Halifax, Nova Scotia. In 2010 close to 200 students from 36 colleges traveled from as far as Puerto Rico and California.

The NURDS symposium enables undergraduate students to refine their research skills by presenting high-quality science research to their peers for valuable feedback and input.

Topics of presentations cover a broad range of sciences, such as marine biology, ecology, evolution, environmental sciences, biochemistry, analytical chemistry, physics, and oceanography. This year, students also attended workshops organized by UNE students to learn about local intertidal fauna, atomic force microscopy, epifluorescent microscopy, seal necropsy, and rat behavior.

Undergraduate Research Offers New Opportunities for Students

Undergraduate research is thriving at UNE. In accordance with its strategic plan, the College of Arts and Sciences has invested significant resources in strengthening and broadening its program of undergraduate research. Last summer, Dr. Maryann Corsello, Associate Professor of Psychology, was appointed UNE’s first Coordinator of Undergraduate Research.

New initiatives feature a growing Summer Research Program that culminates in a Summer Research Symposium, a new website at www.une.edu/cas/research, faculty workshops conducted by the Council on Undergraduate Research, the development of the course “Research Across the Disciplines,” expansion of the Arts and Sciences Symposium in the spring, and increased opportunities for social science and humanities faculty and student involvement. Students from a variety of disciplines are currently presenting their research at local and national conferences.

Maryann Corsello
Associate Professor of Psychology
Coordinator of Undergraduate Research
The Stevenson Lab is directed by Glenn W. Stevenson, Ph.D., Assistant Professor of Psychology at the University of New England. The lab is currently pursuing three distinct yet overlapping areas of research:

1. Development of novel and valid preclinical methods to quantify chronic pain and pain relief
2. Assessment of the neural and behavioral toxicity of a class of abused drugs known as the amphetamines.
3. Assessment of the addiction liability of novel mu/delta receptor opioid pain relievers using drug self-administration and choice procedures

An important mission of the Stevenson Lab is the training of UNE undergraduate students, as they represent our nation’s future scientific potential. Currently, the lab is composed of UNE undergraduates majoring in psychology, psychobiology, neuroscience and medical biology. Students are responsible for running experiments, data collection, data analysis and interpretation, presentation of results at weekly lab meetings and annual national meetings, as well as thoughtful contribution to scientific design. Research funding to Glenn W. Stevenson is provided by the National Institutes of Health/National Institute of Arthritis and Musculoskeletal and Skin Diseases, and the University of New England.

SPARTACUS:
A Systemic PARTnership Aimed at Connecting University and School

Stephan Zeeman, Charles Tilburg (Dept. of Marine Sciences), and Susan Hillman (Dept. of Education) head up a National Science Foundation GK-12 grant that supports an innovative project designed to partner graduate students in marine sciences with local schools. The project engages Maine K-12 students and teachers in six Maine school districts in inquiry- and place-based learning in science, technology, engineering, and mathematics (STEM) by placing graduate students into K-12 classrooms as science resources for the teachers. The overall goal of the project is to provide science graduate students with improved communication skills and allow the graduate students to strengthen the STEM skills of K-12 students.

Lessons within the SPARTACUS project are based on the Saco River watershed, which encompasses a large geographic area including the Maine schools and the University of New England. This local watershed provides an ideal teaching environment for students to study the interrelationships of physics, chemistry, biology, mathematics, and geology. Using the settings of this local watershed and UNE’s Saco River Coastal Observing System (SaRCOS), graduate students share their roles in investigating how precipitation drives river discharge, which in turn, governs the coastal current, which influences coastal weather and surrounding habitats. As a result, K-12 students get a clear picture of how science applies to their lives. Through the collaboration of graduate students and teachers, SPARTACUS provides graduate students with an opportunity to gain an understanding of the educational process, develop communication skills and team building, and appreciate the importance of K-12 outreach as a professional commitment. K-12 students and teachers are given the opportunity to participate in authentic inquiry-based research. This place-based inquiry engages even reticent science students in active learning and brings together school districts’ needs, scientific research, and place-based inquiry education. Schools benefit from professional development of teachers and enrichment of the learning environment, while society gains greater scientific and technical literacy.
On Dehumanization

“We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights that among these are Life, Liberty and the pursuit of Happiness.”

These thirty-six words express the great ideal of universal justice and equality, the idea that all men—that is, all human beings—have the right to life, liberty and the pursuit of happiness just because they are human. But they also raise a vexing question. Who, exactly, should be counted as human? The American colonists weren’t sure. In fact, many of them believed that African slaves and Native Americans were subhuman animals.

This attitude was nothing new. The ancient Chinese, Egyptians and Mesopotamians thought of neighboring peoples as less than fully human, as did classical Greek writers like Aristotle. In fact, as we look at the record of human atrocity—of war, genocide, colonization, racism and xenophobia—we find, again and again, that people tend to perceive others as human in form, but subhuman in essence. Typically, they think of them as bloodthirsty predators, filthy vermin, bacilli or game animals. The major genocides of the last century or so make this chillingly clear. When German colonists in what is now Namibia slaughtered the indigenous Herrero and Nama people in the first genocide of the 20th century, they called them “baboons”. During the Armenian genocide of 1915-16, the victims were thought of as dogs, pigs and bacilli. The Nazis explicitly described Jews as subhumans (Untermenschen), comparing them to rats and lice, and the Rwandan Hutus who hacked their Tutsi neighbors to death in 1994 conceived of them as inyenzi (cockroaches), fit to be crushed under foot.

These examples, as well as many more, show that thinking of others as less than human allows us to commit unspeakable acts of cruelty and violence.

This phenomenon is called dehumanization. Although frequently mentioned in popular and scholarly writings, there has been hardly any research into dehumanization. For the last five years, Smith has been investigating it from an interdisciplinary perspective, drawing on work in historiography, psychology, media studies, biology, anthropology and philosophy. Smith has documented its prevalence from ancient times to the present, traced how the concept evolved over the centuries, and have developed a theory of what goes on in the human mind when we conceive of other people as less than human. St. Martins Press will publish Smith’s book on the subject in 2011. This will be the first book-length scholarly treatment of dehumanization ever published in the English language (and possibly in any language), as well as the first publication by any scholar of a comprehensive, interdisciplinary theory of dehumanization.
When the Oxygen network chose in its 2008 Olympic programming to give comprehensive coverage to equestrian events — a first in television history for the only Olympic sports in which men and women compete against each other, on equal terms — it seemed to many a no-brainer. Girls and horses have a natural affinity, right? This assumption troubles literary animal studies scholar Susan McHugh, whose research has uncovered precious few antecedents to Enid Bagnold’s 1935 bestselling novel *National Velvet*, known to most today through the classic 1944 film featuring Elizabeth Taylor in the title role as an unlikely and at that time illegal winner of the Grand National Steeplechase. If the girl-horse connection is so obvious, then why were women riders barred from these competitive international arenas, for instance, by members of the British Jockey Club until 1978? And why are there so few images and stories of girls and horses before the twentieth century? The search for answers to these questions set McHugh on a course of painstaking archival research.

Awarded the John H. Daniels Fellowship for Research in Residence at the National Sporting Library, McHugh spent a month of sabbatical time combing the archives to find an answer to this literary and cultural conundrum. Tracing the history of jumping sports back to foxhunting stories, McHugh found an intriguing clue in the 1865 novel Mr. Facey Romford’s Hounds by R.S. Surtees (whose novels, despite influencing Dickens, are now out of print), in which accomplished horsewoman Lucy Glitters is accused of being a “pretty horsebreaker.” Writing in a more prudish era, Surtees’s few literary critics made glancing references to this character’s similarities to a notorious courtesan of the day, in whose biographies McHugh at last discovered that “pretty horsebreaker” was a euphemism for the most common form of paid work then available to female riders.

Like car-show models in the next century, the job of pretty horsebreakers was to attract attention to themselves (and away from their mounts’ defects), the kind of public display of the body that in Victorian England was tantamount to prostitution. By the end of the nineteenth century, more sympathetic depictions of women as stunt-show or “circus riders” like Finch Mason’s 1880 story “The Queen of the Arena” strengthened this fictional (and often factual) association with the daring and athleticism required of cross-country riding to hounds. But the tainted sexuality coloring the earlier representations charts a precarious way to the greater involvement of girls and women in riding sports by the twentieth century.

Relating this historic struggle for equality to representational patterns in human-animal companionship, and both to the increasingly sexualized depictions of violence toward girls and horses together in more recent narratives like *International Velvet* (1978) and *The Horse Whisperer* (novel 1996; film 1999), McHugh’s research uncovers how this literary and cultural history informs the novelty of *National Velvet*, and it is part of her forthcoming book *Animal Narratives* (2010).
Professors Matthew Anderson and Cathrine Frank (Dept. of English and Language Studies) recently directed a five-week National Endowment for the Humanities (NEH) Summer Institute on "The Rule of Law: Legal Studies and the Liberal Arts," funded by a $165,000 grant from the NEH. The grant provided a stipend to 25 college and university faculty from across the country, selected through a competitive application process, to spend five weeks in residence on the Biddeford campus engaged in daily seminars with a series of 11 distinguished guest faculty from institutions including Yale Law School, Columbia, and Princeton.

The institute had a two-fold aim. On the one hand, participants explored a set of questions that provide a framework for understanding the cultural conditions necessary for the possibility of the rule of law, with a specific focus on the U.S. experience: where and how does the idea of the rule of law originate in the Western tradition? What is its history in the United States? What are its key texts, traditions, and institutions? How does it emerge in the artistic and literary imagination? Is there more than one rule of law in the American experience, and, if so, how do local "rules of law" comport with a national identity? On the other hand, the institute participated in the broader effort, under way both in legal studies and in the humanities and the social sciences, to develop the study of law as a discipline of the liberal arts, not just a professional training—especially at the undergraduate level. According to Professors Anderson and Frank, "the idea is to establish a field of interdisciplinary legal study in the liberal arts that might have approximately the same intellectual relationship to law school that the study of basic (i.e., "pure") science in the natural sciences does to medical school. "At its heart," they write, "the institute aims to help cultivate an understanding of the rule of law at the level not only of statutes and constitutional documents, but also of sensibility and imagination."
History begins with documents – the letters and diaries, treaties and treatises, maps and manuscripts that record a slice of the past. This project began with a chance find at an antiquarian book show – an intriguing record of an event more than 100 years old, but strangely familiar. Madeline Pollard, attending college in Cincinnati in the 1880s, meets on a train a congressman from Kentucky, Colonel William Breckinridge, a Civil War hero, multi-term member of the House of Representatives, and a man many years her senior. They begin a long affair and he, allegedly, promises to marry Pollard upon the death of his ill wife. By 1893 Breckinridge is a widower but that spring he secretly marries a distant cousin. Pollard discovers the deception and sues Breckinridge for Breach of Promise. The six-week trial, in 1894, was national news, a huge scandal that made public the private lives of all involved. Detectives were hired, spies were employed, and fist-fights broke out in court. Much to everyone’s surprise, Pollard won and with a $15,000 settlement was vindicated . . . or was she? Was Pollard a crafty “adventuress” who used Breckinridge to gain access to the elite society she craved? Or was she a naïve young woman in love, taken advantage of by a politician whose name was being mentioned as a candidate for president? Was Breckinridge a cad, or was he overwhelmed by a tenacious, and perhaps unstable, liaison? And what happens next to this woman scorned – her reputation fodder for national gossip, but in the end with the economic means to re-invent herself? Beyond the titillating newspaper accounts and quickly produced books with their “graphic stories of the sensational incidents,” what historical evidence remains to document these lives? The search for this history begins at the Library of Congress.

Jennifer Tuttle’s research combines the fields of Literature & Health, Gender Studies, U.S. Literatures, and the American West. A significant portion of her work focuses on the prominent American author, lecturer and social reformer Charlotte Perkins Gilman (1860-1935), particularly Gilman’s writing in and about California.

Gilman is best known for her 1898 treatise Women and Economics, which traced gender inequality to women’s economic dependence upon men, and her 1892 short story “The Yellow Wall-Paper,” which portrays a woman’s descent into madness resulting from a “rest cure” for nervous prostration. But she had a long and varied career in which she used both print and the pulpit to address a range of issues, from women’s suffrage to pacifism to architectural reform. With Denise D. Knight, Tuttle has recently published “The Selected Letters of Charlotte Perkins Gilman” (2009; University of Alabama Press), which makes available the last portion of Gilman’s private writing that had remained unpublished and therefore largely inaccessible to readers.

The project was a vast undertaking. For years Tuttle and Knight had separately been collecting Gilman’s letters from various archival repositories where they were doing research on other issues related to Gilman. A letters volume was needed, but the project was so large that it was almost too daunting to undertake alone: Gilman was as prolific in her letter-writing as she was in other areas of her career, corresponding with a veritable “who’s who” of turn-of-the-century public life. Thus Tuttle and Knight decided to pool their resources, transcribing all of Gilman’s extant correspondence, which constitutes approximately 17,000 pages of manuscript material. The resulting volume of selected letters spans nearly Gilman’s entire life. It begins with her first extant letter, written to her grandmother when she was about seven years old. It concludes with her last known letter, written two days before she ended her own life (suffering from inoperable breast cancer, she died peacefully by inhaling chloroform). The Selected Letters provides a more nuanced, accurate, and complex understanding of Gilman and her writing than we have had before, offering a glimpse of the private woman behind the public persona and opening many new areas for scholarly investigation.
How Ideas about Parenthood Undermine our Politics
Brian Duff | Political Science

What if the experience we imagine to be the source of our greatest strengths and virtues is actually at the root of our most intractable political problems? This is the argument Brian Duff makes regarding parenthood in his book *The Parent as Citizen* (University of Minnesota Press, 2010). When leaders and citizens in the United States articulate their core political beliefs they often do so in terms of parenthood and family. But while the motives might be admirable and the sentiments deeply felt, the results of such thinking are often corrosive to our larger democratic goals. Duff reveals how efforts to make the experience of parenthood inform citizenship contribute to the most persistent problems in modern democracy and democratic theory.

Duff shows how influential theories of democratic citizenship rely on the experience of parenthood to help individuals rise to the challenges of politics, and demonstrates that this reliance has dire and unintended consequences. Duff reveals where the desire to make use of parenthood in theorizing citizenship comes from, why it continues to be so tempting, and why it so often goes wrong. When parenthood is imagined to summon a confidence in our political virtues, it often uncovers profound insecurities. When parenthood is thought to instill the openness to contingency and change appropriate to democratic political contest, it often produces unexpected fundamentalism.

Duff identifies and probes the dark anxieties that emerge when parenthood is thought to be a forge of character and a test of our worthiness for citizenship. In showing how problems that plagued canonical theorists of citizenship still trouble contemporary thinkers and citizens alike, his insights are deeply relevant to present-day politics.

Abstract Representations of Water
Sarah R. Gorham | Creative and Fine Arts Department

Painting images of water is an analogy to our emotions and an avenue toward deciphering the complicated nature of the human condition. We are selves seeking connection with others, while simultaneously selves seeking peace, affirmation, and refuge from the human condition. Sarah Gorham’s artwork seeks to understand dialogue between surface and depth, between parts of self, and between self and others.

Gorham’s work has become more cropped and separated, focusing less on a whole scene and more on a close-up detail. She uses the palette knife for ease of application, to use up leftover paint, and to create a sharp-edged chaotic look. The layering of the paint lends itself well to the concepts of depth and surface. These layered paintings present a liminal quality that addresses the in-between. It is interesting to see the bridge, the connection, the threshold between self, parts of self, and others.

Enhancing Online Learning
Michael Beaudoin | Education

In 2007, the International Board of Standards for Training, Performance and Instruction (IBSTPI) undertook an ambitious research project — to survey learners enrolled in diverse education and training offerings delivered in an online format. Findings are intended to assist the research team, headed by Beaudoin, in developing a set of validated and broadly applicable competencies which are critical to success in online and blended learning environments, and that could be widely disseminated for use, not only by online learners, but also by providers designing and delivering online education and training. Knowing what learners find to be the most effective and least useful features and practices for success in online settings can be instructive to those wishing to enhance the teaching-learning process. It is hoped that this comprehensive and systematic research effort will produce a credible set of widely applicable guidelines that overcome the present limitations of largely anecdotal data, and ultimately enhance online practice.
Grey squirrels everywhere! We see them on campus, in our yards, and crossing the road. We see them in town, often scurrying under the same tree. Have you ever wondered if it is the same squirrel you see every day, every month, or from year to year? Is the squirrel you saw in front of the Campus Center at UNE the same squirrel you saw while walking on Hills Beach in Biddeford?

Although grey squirrels are the most commonly encountered mammal in New England, we know surprisingly little about them. We have a poor understanding of how long they live, how far they move, or even if those that we see on a daily basis are male or female. To answer these questions, Professor Noah Perlut and his students initiated a long-term research project studying grey squirrels on UNE’s Biddeford Campus.

They are exploring squirrel movement patterns and survival, and trying to understand how gender and body size affect movement and survival. In order to gather data, they have been busy live-trapping grey squirrels across campus, evaluating their gender, taking body measurements, and tagging each squirrel with a uniquely colored ear-tag so that they can be individually recognized without having to be recaptured.

While the students are exploring these fundamental ecological questions, they are equally engaged in wildlife habitat conservation of squirrels and all southern Maine land mammals.

Top: Colored ear-tags help individually identify the grey squirrels on campus.

Above: Cody Chretien (Environmental Science major) measures the ear of a grey squirrel with Dr. Noah Perlut.

Tracking the Resident Squirrel

Noah Perlut
Assistant Professor
Department of Environmental Studies
Researching the Physiological Ecology of Fish

Central to any successful fishery management plan is the availability of accurate, detailed, and updated ecological information on species that are impacted by commercial or recreational fishing industries. Conservation efforts directed toward the collection of this data helps to ensure a balance between the needs of an ecosystem and the needs of a fishing industry. Research in Dr. James Sulikowski’s lab focuses on the life history and physiology of fish and the human-induced effects on these processes.

This research has focused on many different sharks (such as the spiny dogfish), skates (such as the thorny) and other large charismatic fish (such as Atlantic sturgeon). Dr. Sulikowski is attaching satellite tags to spiny dogfish to better understand both the vertical and horizontal movement patterns of this species. With the use of this new technology, Dr. Sulikowski hopes to offer new management strategies that will be both beneficial to commercial fisherman as well as the ecosystem. Understanding how skates, or any other fish, respond to the stress of being captured and then thrown back into the sea is listed by the National Marine Fisheries Service as a research priority area.

In collaboration with the New England Aquarium and UNE graduate student Angela Ciccia, Dr. Sulikowski is addressing this bycatch issue in skates by monitoring the short-term discard survivability of four species in the Gulf of Maine (winter, smooth, little, and thorny skates), following capture by otter-trawl and gillnet. Working with different fishermen and various geographic areas in the Gulf of Maine, this research will quantify the survivability of each species, resulting in more accurate management of these cartilaginous fish.

Atlantic sturgeon populations have been in trouble for over 10 years, and as such they are currently listed as a federal species of concern. In collaboration with the Maine Department of Marine Resources and UMaine Orono, Dr Sulikowski and UNE graduate student Caitlyn Little are investigating the degree of demographic connectivity (immigration and emigration) and correspondence (similarity or uniqueness of demographic parameters) among Atlantic sturgeon living within the Gulf of Maine. This research will utilize acoustic telemetry, among other methodologies, to better understand how this fragile species is utilizing the Gulf of Maine and associated river systems throughout its life cycle.

James Sulikowski
Assistant Professor
Marine Sciences
Connecting Past with Present in Research

How did present-day landscapes develop? In what ways has the past culture and economy of local inhabitants influenced land use practices and thus landscape change? Did historic urban-rural interdependencies underlie past rural cultures and economies and thus function as a root cause of current landscape pattern? Much environmental history scholarship aims to answer these related questions.

Department of Environmental Studies professor Michelle Steen-Adams is working with UNE student Laura Williams ’11 and collaborators at Laudholm Trust and the Wells National Estuarine Research Reserve (NERR) to apply these questions to the landscape encompassed by the Wells NERR, located 15 miles southwest of the UNE Biddeford campus.

In spring 2009 a confluence of needs came together to motivate development of a project proposal, which was selected among a pool of applications:

- a call for undergraduate-engaged research proposals;
- a research program goal to highlight place-based historical investigations;
- collaborators’ goal to document the family history of the former owners of a site that is now a land trust;
- urgency posed by aging interviewee participants;
- initiation of a major exhibit renovation at Wells NERR, which sparked interest in developing additional primary source materials.

The first stage of the project was carried out in summer 2009.

Professor Steen-Adams and collaborators are conducting this environmental history project through a combination of oral history interviews and primary and secondary source document analysis. The research team is accomplishing several goals: gaining insights into the ways that past social conditions influenced land use practices, which in turn shape current landscape pattern; helping to document the history of an important conservation site in southern Maine; and fostering undergraduate understanding and appreciation of the research process.

Student Laura Williams summed up her experience in this hybrid scholarly history and public history project: “It is one thing to conduct research, but it is another to make it meaningful to everyday people…Participating in a collaborative undergraduate research project was truly a positive and beneficial experience…I learned about the process of collaborative research, was introduced to the fields of public and environmental history, and developed a strong relationship with one of my professors.”

Michelle M. Steen-Adams
Assistant Professor
Department of Environmental Studies
Understanding and Protecting the Saco River Estuary

One of the unique things about the University of New England is its location right on the Saco River. The Saco begins in the white mountains of New Hampshire and empties into the Gulf of Maine just beyond campus. From the mouth of the river up to the first dam, the tide mixes salt water with fresh.

This part of the river is the Saco River estuary, and it is the focus of a new research project aimed at sustaining the health of the estuary into the future. A team of researchers and undergraduate students is currently studying the ecology of the estuary as well as the policies, regulations and economics that influence this portion of the river. Faculty from the departments of Environmental Studies, Biological Sciences, Business Administration and Marine Science, plus the research director from the nearby Wells Estuarine Research Reserve, have all come together to collaborate on this project.

UNE students work with a Wells Reserve scientist (a UNE alum) to set up a fishing net near the kiosk.
One of the first steps has been to gather information from the people who use and manage the river. This stakeholder analysis is helping to determine what the community values, and will inform future research efforts. The first phase of the project is also looking at how development along the river’s shoreline impacts the fish and birds that use the estuary, as well as the plant communities in the marshes that line the river’s edges.

Students are working on all aspects of the project, in courses such as Ecosystem Management and Environmental Communication, and as research assistants. The research assistants are gathering stakeholder input, analyzing the economic value of the estuary, and studying the fish and birds that use this part of the river. Because the project is interdisciplinary, these students are exposed to research methods in both the natural and the social sciences.

When field season begins, students will don rubber boots, binoculars and sunscreen to travel throughout the estuary collecting ecological data. A third stakeholder workshop is planned to bring together UNE scientists, policymakers and resource managers to discuss the future of the estuary. Stay tuned as the project evolves and as this group of UNE faculty and students works to understand and protect the future of the Saco River estuary.

Hawaiian Forest Birds
Bethany L. Woodworth  |  Environmental Studies

Hawaii’s forest bird community is the most insular and most endangered in the world and serves as a case study for threatened species globally. Ten have disappeared in the past 30 years, nine are critically endangered, and even common species are currently in decline.


Woodworth and her coeditors, researchers with the U.S. Geological Survey in Hawaii, conceived of the project in 1998. It became clear to them at the time that they needed to synthesize the results of more than a decade of new research on Hawaiian forest birds, conducted by researchers at the U.S.G.S. and at sister agencies and universities in the islands.

EPA Lifetime Achievement Award
Owen Grumbling  |  Environmental Studies

The U.S. Environmental Protection Agency honored University of New England Professor Owen Grumbling, Ph.D., with the 2009 Lifetime Achievement Environmental Merit Award.

Professor Grumbling, who is chair of UNE’s Department of Environmental Studies, was recognized for his significant contributions to environmental awareness and problem solving.

Through his passion for conservation and the environment, Grumbling has inspired and educated countless students as well as the entire community of the town of Wells, Maine, to appreciate and actively participate in protecting southern Maine’s extraordinary surroundings.
Center for Land-Sea Interactions

*Human, River, and Ocean Health*

Research in CLSI focuses on physical connections between watersheds and the coastal ocean, and materials and organisms moving within and between these systems that impact human and environmental health. We are also interested in how land use and climate change alter the dynamics of these linked systems.

The Saco River Coastal Observing System (SaRCOS) includes an oceanographic data buoy and shore station that monitor the freshwater discharge plume from the Saco River as it is transported and mixed in Saco Bay. Data from these sensors helps us evaluate how organisms in river water spread once they enter the ocean.

CLSI biologists use a wide variety of techniques to address the interdisciplinary problems in Saco Bay. Approaches include everything from field sampling and sophisticated instrumentation to state-of-the-art laboratory and genetic analyses.

Juveniles of many fish species appear to use the Saco estuary as a nursery ground. As they grow up and move out of the estuary, they may carry with them fecal bacteria and pathogens acquired in the estuary.
CLSI biologists use trawls and other field methods to sample fish and plankton in and out of the river plume. Nutrient rich river water may stimulate phytoplankton growth and provide fuel for a food chain that includes larval fish.

Combined sewer overflows (CSOs) on the lower Saco River periodically release untreated sewage into the river. These CSOs are a likely source of fecal bacteria both in the river and at nearby beaches in Saco Bay (including Old Orchard Beach). These bacteria also exhibit high levels of antibiotic resistance, either as a consequence of antibiotic usage in human populations, or in livestock higher in the watershed. These and other pharmaceutical products that enter the environment are being studied by CLSI collaborators in the College of Pharmacy.

The Saco River is also a likely source of pathogens that may move between terrestrial and marine systems. CLSI biologists are currently using molecular genetics to identify marine and terrestrial hosts that share common pathogen genotypes – such groups are likely to be exchanging pathogens on a regular basis.

Anadromous fish, including striped bass, alewives, and sturgeon, occupy the Saco estuary on a seasonal basis, and may provide an additional conduit for the movement of pathogens between estuarine and marine systems.
The focus of research in Professor Ono’s lab is pinniped (seals, sea lions, fur seals and walrus) behavior, ecology, biology and conservation. Currently, studies include North western Atlantic harbor seals (Phoca vitulina), grey seals (Halichoerus grypus) and Pacific coast Steller sea lions (Eumetopias jubatus). She is especially interested in the rapidly expanding grey seal population in New England, and its effects on other marine mammal species as well as fisheries interactions, both direct and indirect.

Above: Grey seal breeding aggregation: The larger animal at the center of the photo is an adult male. Adult females are the smaller gray animals lying near their pups, which are covered with a white lanugo coat.

Right, top: Almost moulted grey seal (Halichoerus grypus) weaned pup. Pups are born with a white lanugo coat which they moult before leaving their natal islands.

Right, bottom: Fight between adult male grey seals during the breeding season. The two animals in the center of the photo are males, the lighter animals in the background are adult females.
Serendipity plays a role in science! Right Whales were the original target species for our study of distribution and migration of large pelagic (open water) species. We were going to put satellite transmitters on these whales to learn more about their habits. Almost half the population of North Atlantic Right whales disappears in the winter. The remainder of the 300-400 individuals migrates to the coastal waters off Florida and Georgia. Since they are an endangered species, however, we researchers could not get permits to attach the satellite transmitters. However, we noted that they were often seen in the same area with Basking Sharks. Like the right whales, Basking Sharks feed on microscopic crustaceans (Calanus finmarchicus). We surmised that if we could tag Basking Sharks, we might also learn more about the Right Whales.

We tagged 25 Basking Sharks with Pop-off Archival Tags (PAT), which store data every 10-15 seconds on water temperature, depth and light intensity. The data are aggregated every six hours into 12 discrete levels of depth or temperature. The light intensity is used to help identify the location of the tag using sunrise and sunset times. We used the standard calculation and added some refinements including the sea surface temperature, and a more complicated scheme using archived temperature profiles from the entire Atlantic Ocean.

The surprising result of this research was that we found that some of the Basking Sharks traveled much further than anyone expected. They exceeded their range by traveling from the Gulf of Maine across the equator to waters off the coast of Brazil. This means that genetic exchange may take place among northern hemisphere populations and those of the southern hemisphere.
“Next Generation” of Health Services for Maine

OneMaine Health Collaborative works with CHPPR to explore major trends in the delivery of health services and identify unmet health care needs in Maine.

Maine’s three largest health systems—MaineHealth, Eastern Maine Healthcare Systems (EMHS), and MaineGeneral Health—have contracted with the UNE Center for Health Policy, Planning and Research (CHPPR) to conduct a comprehensive health needs assessment for Maine. The study will explore major trends in the delivery of health services and identify unmet healthcare needs. The three health systems have joined together as the OneMaine Health Collaborative for the purpose of working together and with other private and state government stakeholders to improve the health of Maine citizens.

The research will consist of a statewide health survey (N = 6500 households) along with the analysis of publicly available vital statistics and health data sources to paint a comprehensive picture of key health status and service needs facing the state. This will help answer two critical questions: 1) “What are the major health issues facing Maine adults?” and 2) “What are the state’s unmet acute, preventive and care management health service needs?” CHPPR’s community health assessment methodology, employed in over 80 similar studies across the U.S., will be used to answer these questions.

Timely, accurate health information obtained for this study will be organized at both the county and state levels. Analysis of this information will yield recommendations on ways to strengthen the healthcare delivery system especially for the prevention and care management of chronic health conditions.

This is an important opportunity to identify the factors driving health status differences within Maine overall and geographically. It provides a unique opportunity for collaboration between public health and the private delivery system to plan the next generation of health services for Maine citizens. The data sets yielded by the study also provide an opportunity for students and faculty at UNE to conduct research on the health of the Maine residents.

Occupational Therapy Research
Elizabeth Moyer | Occupational Therapy

Professor Moyer is interested in non-drug interventions that improve abilities in people diagnosed with Parkinson’s disease. Since 2006, she and her team have completed three pilot studies that involved a total of 20 local people diagnosed with Parkinson’s disease. All three studies involved only 10 intensive one-hour sessions carried out by teams of occupational therapy students. One study focused on improving coordination, posture, speed in functional self-care activities, and handwriting size. Another study focused on improving the cognitive and visual perceptual areas impaired in people with Parkinson’s disease.
Examination of a Statewide Law Banning Junk Food and Beverage Marketing in Maine Schools

Researchers will develop specific recommendations to strengthen legislation in Maine and nationally.

Investigators from UNE’s Graduate Programs in Public Health are investigating the nature and extent of junk food marketing in 20 randomly selected Maine high schools. The aim of the research is to assess-compliance with the first statewide law banning brand specific junk food and beverage marketing in schools. Researchers will develop specific recommendations to strengthen legislation in Maine and nationally.

Maine children have the highest rate of obesity among children in New England and face a unique combination of barriers to reducing chronic disease. Consumption of non-nutritious food and beverages has been shown to be a key determinant of the current obesity epidemic among youth. Food advertising affects children’s food choices, food purchase requests, diets and health. Maine’s Chapter 156, the first statewide law banning junk food and beverage marketing in schools, went into effect in September 2007. No statewide policies to restrict marketing in schools exist or have been studied and little is known about how best to create and implement marketing policy change in schools.

Data collection will be complete by the end of April 2011. Many instances of junk food and beverage marketing have been found even with the new law in place.

Study findings will be made available through presentations and briefs to local, state and national stakeholders and will be made available through UNE’s Graduate Programs in Public Health website as soon as they are available.

The Maine-Harvard Prevention Research Center

The Maine-Harvard Prevention Research Center (MHPRC) has a new home at the Center for Community and Public Health at UNE. Since 2000, the Harvard Prevention Research Center in collaboration with the Maine Center for Disease Control and Prevention has been working with partners in Maine to reduce obesity, improve nutrition and increase physical activity for children and adults through applied research, research translation, education and training and policy development. The MHPRC has a steering committee of public and private partners who help guide the direction of the MHPRC and collaborate on specific initiatives in Maine.

Over the next year, the MHPRC will be evaluating Maine’s first-in-the-nation law to prohibit junk food advertising in school, expand worksite wellness initiatives, bring researchers to Maine to inform new obesity initiatives, expand a child care center physical activity and nutrition program, and support the development of a three-year obesity policy agenda for Maine. The Center for Community and Public Health will add both valuable research capacity to the MHPRC and the ability to work with students on research and policy efforts.

Prevention Research Centers (PRC) are funded by the federal Centers for Disease Control and Prevention and are a network of academic researchers, public health agencies, and community members that conducts applied research in disease prevention and control. There are 37 Prevention Research Centers in the U.S. and the Harvard Prevention Research Center was first funded in 1998 and is the only multi-state PRC.
Saco Human Performance Laboratory
Erin Hartigan | Physical Therapy

The Saco Human Performance Laboratory is the product of a long-standing collaborative relationship between the Athletic Training Education Program (ATEP) of UNE and OA Centers for Orthopaedics, P.A. (OAP) of Portland, Maine. Dr. Douglas Brown and Dr. D. Scott Marr serve as Co-Medical Directors for ATEP, and regularly meet with the program director, Wayne Lamarre, to discuss curriculum and clinical experience opportunities for ATEP students.

The Saco Human Performance Laboratory presents many opportunities for teaching, scholarship, and service that were not previously available to UNE students and faculty, and it provides excellent visibility for the University because of its location.

Faculty from the Westbrook College of Health Professions have been busy piloting the equipment in preparation for their research projects. Dr. Isao Okuda, PhD, ATC, Assistant Professor in the Athletic Training Department, will perform golf swing analysis using the newly purchased Qualysis 3-Dimensional cameras. Dr. Erin Hartigan, PhD, DPT, ATC, Assistant Professor in the Physical Therapy Department, will conduct research on lower extremity and trunk control during daily and sport-specific activities. UNE student Brian Bisson volunteered his time to repeatedly allow Dr. Hartigan to place markers on his arms, legs, and trunk and have him walk, run, and jump to assure the cameras could see all markers during each activity. For example, after piloting with the equipment, Dr. Hartigan will instruct UNE students on how to process the jump data from the cameras.

The Humanities and Nursing
Karen T. Pardue | Westbrook College of Health Professions

Investigating the use of arts and humanities as an instructional approach in nursing education is of particular interest to Karen Pardue, Assistant Dean in the Westbrook College of Health Professions and Associate Professor of Nursing. Health Profession Education is steeped in the exploration of the sciences, and graduates must possess an in-depth mastery of cognitive information in order to practice safely and provide quality patient care. At the same time, health professionals need to understand what it means to be human, to live authentically and in context with others, and the complexity of human relationships. Requisite in nursing is the ability to interact with patients in a caring and compassionate manner, and to demonstrate genuine empathy for patients’ experiences. Engagement in the arts and the humanities, which includes instructional approaches incorporating music, poetry, novels, drama, paintings, film, and art, sensitizes nursing students to the realities of the human experience. This unconventional pedagogy provides a powerful teaching strategy to support the development of a caring, compassionate and reflective health care provider.
Immune and Genomic Responses to Resistance Exercise

Lara A. Carlson | Exercise & Sport Performance

Acute endurance exercise lasting for one hour or more has been reported to alter the immune system. Epidemiological data suggests that endurance athletes are at an increased risk for upper respiratory tract infection (URTI) during heavy periods of training and up to two weeks following a competitive race. Less is known, however, about immune response to resistance training. Strength training programs can cause muscle damage and soreness because of weights or resistances utilized in exercises. This type of muscle damage not only causes soreness, but also contributes to inflammation in the surrounding tissue and alterations in immune cells in peripheral blood.

Evidence indicates that for several hours following heavy exertion, components of both the innate and adaptive immune system exhibit suppressed function. Recent data indicates that exercise influences genes associated with key physiological functions such as inflammation, growth and tissue repair. Additionally, genes in peripheral blood mononuclear cells (PBMCs) that are altered by exercise are also associated with mediators known to be involved with cardiovascular inflammatory and metabolic diseases in human subjects. Future research on the mechanisms underlying the immune response to intensive exercise is necessary before consequential clinical applications can be drawn.

Dr. Lara Carlson, DPE, FACSM, Assistant Professor in the Department of Exercise and Sport Performance will examine the genomic response to an acute bout of resistance exercise using microarray analysis. We hypothesize that the resistance exercise insult would activate PBMC genes involved in inflammation, cell growth and repair, and apoptosis. Microarray technology would help support whether or not any of the post-exercise differential leukocyte patterns coincide with gene expression responses.

Recent data indicates that exercise influences genes associated with key physiological functions such as inflammation, growth and tissue repair.

The FUN Program

Jane O’Brien | Occupational Therapy

The FUN (Fitness, yoU, and Nutrition) Program is a 10-week after-school intervention. This program targets children’s motivation and interests in physical activity and nutrition to help children change habits and achieve health and wellness. Children participate in weekly physical and nutritional activities based around a theme. For example, on Beach Day, children enjoy playing games with an 8-foot ball and hula hoops, making fruit kabobs, and discussing the nutritional benefits of drinking water over soda. The FUN program provides a unique difference as it emphasizes developing a child’s interests and belief in his or her abilities to change habits as a way to impact health. UNE faculty and students examine health outcomes, specifically the program’s impact on childhood obesity, physical performance and habits. The program aims to help children develop long-term behavioral changes by motivating children through fun activities in their own community.
The Center for Excellence in Neuroscience (CEN) has reached broadly across campuses to include faculty researchers, students and scholars from a variety of disciplines who share a passion for the neurosciences.

The CEN is directed by Dr. Ed Bilsky, a Professor in the College of Osteopathic Medicine (COM), with shared leadership from faculty such as Dr. Ian Meng, an Associate Professor in COM. The center is helping the university build its research infrastructure, attract greater levels of extramural funding, and engage more students in meaningful scholarship. Areas of research expertise include the neurobiology of pain, prenatal protein malnutrition and brain development, neural mechanisms of dyspnea and air hunger, and drug development for various CNS diseases and disorders.

Bilsky’s own laboratory is focused on translational research in the areas of pain, addiction and other neurological disorders. His research has attracted over $4.8 million in funding and he has published over 55 peer-reviewed publications in leading pharmacology journals. He is also co-founder of two early stage biotechnology companies and is passionate about economic development in the state of Maine.

Consistently funded by the National Institutes for Health, Meng’s research is focused on mechanisms of migraine headache, including effects of chronic drug exposure on headache and the transformation of migraine to chronic daily headache. Meng has played a key role in the creation of a new undergraduate major in the neurosciences at UNE and also actively promotes collaborations between the sciences and the humanities.

CEN faculty members have been active this past year in submitting and garnering a variety of grants, contracts and fellowships. The group is now focused on the resubmission of a COBRE center grant that received a promising score and reviews on the first submission. If funded, this $10 million grant will provide a dynamic training environment for junior neuroscience faculty. The CEN has also been working with each college to help recruit additional outstanding faculty. This includes new hires in psychology and developmental biology in the College of Arts and Sciences and a neurobiologist in the College of Pharmacy.

Another benefit provided by the center is the coordination of a world-class seminar program that brings leading scientists, clinicians and other thought leaders to campus to interact with students and faculty. CEN members are also conducting a variety of community outreach activities including K-12 educational programs to local school systems. Another exciting aspect of the center is the collegial atmosphere it creates. A recent CEN event, for example, was co-hosted by the College of Arts and Sciences and the Office of the Vice President for Research. The evening highlighted the work of professors David Smith, Geoff Ganter, Glenn Stevenson and Stephen Burt (whose art is featured on the cover). Other examples of CEN collaborative and multidisciplinary efforts are present throughout this magazine and at www.une.edu/research/ cen.
Drug Discovery at UNE

Throughout her career, Dr. Houseknecht’s research interests have focused on the discovery of novel therapeutics (small molecules, biologics and nutritional) for the treatment of diseases associated with metabolic syndrome, psychosis, and diseases of neglect. Dr. Houseknecht has significant scientific and executive leadership experience in driving drug discovery programs in pharmaceutical, biotech, academic and NGO research settings, and she collaborates extensively with biologists, chemists, DMPK specialists and clinicians to progress interesting therapeutic candidates from idea to clinical testing.

Dr. Houseknecht has specific scientific expertise in diabetes and obesity biology, including the central and peripheral regulation of feeding and insulin resistance, and the pharmacology of G-protein coupled receptors and phosphodiesterases, with specific interest in fatty acid signaling via GPCRs. Currently, Dr. Houseknecht’s laboratory is focusing in three areas of research: 1) elucidating the biological regulation of (and identifying potent inhibitors for) a newly discovered target for diabetes therapy, Phosphodiesterase 8B; 2) quantifying and improving the physicochemical and pharmacokinetic properties of novel drug candidates for the treatment of Botulinum A intoxication as a bioterrorism threat (collaboration with Dr. Tobin Dickerson, Scripps Research Institute); and 3) discovering potent inhibitors of CD44 binding as a novel therapy for the treatment of breast and prostate cancer (collaboration with Dr. Olgun Guvench, UNE COP). Dr. Houseknecht’s research is currently funded, in part, by a five-year NIH award (in collaboration with Scripps Research Institute).

Karen L. Houseknecht
Professor
Pharmaceutical Sciences
n 1878, Paul Broca described a part of the brain that has become a common term known to many, the limbic lobe. In contrast with other systems of the brain, such as the motor system and the visual system, the limbic system has many functions but a common theme of controlling behaviors that promote the survival of the individual and the species. Hence, the limbic system has wide-ranging functions such as sleep, feeding and sex, and deciding what to do next. Other famous neuroscientists such as Paul McLean and Wally Nauta have added to the concept of the limbic system over the years, gradually extending its structures to include other parts of the forebrain and the midbrain.

Over the past 10 years, Peter Morgane, Ph.D., and David Mokler, Ph.D., of the Department of Biomedical Sciences in the College of Osteopathic Medicine and the Center for Excellence in the Neurosciences have worked to extend the concept of the limbic system into what they now call the limbic brain.

While both neuroscientists have published extensive research on specific parts of the limbic system throughout their careers, they first came together to publish a review on the broad subject in 2005 with their colleague Janina Galler, M.D., now at Judge Baker Children’s Center, Harvard Medical School (Morgane et al., 2005). They proposed that the limbic system extended from the classic limbic lobe of Broca to include the prefrontal cortex and nucleus accumbens of the forebrain and the raphé nuclei, the source of serotonin neurons, in the midbrain.

In 2006, Drs. Morgane and Mokler edited a full issue of the journal Neuroscience and Biobehavioral Reviews (Morgane and Mokler, 2006) titled “Limbic System: Structure and Function” that included reviews from researchers on various aspects of the limbic system. The issue included reviews on positive emotions, drug abuse, fear conditioning, emotional functions and adaptive behavior and serotonin from prominent scientists throughout the world. Drs. Morgane and Mokler are continuing their work in describing further developments in limbic brain structure and function with an overarching review titled “Extending the reach of the limbic brain.”
Searching for Serotonin at UNE

David Mokler, Ph.D. came to UNE in 1986 to do one thing – continue his research on serotonin, an important chemical in the brain. Twenty-four years later, Dr. Mokler, now Professor of Pharmacology in the College of Osteopathic Medicine and the Center for Excellence in the Neurosciences is continuing his quest.

His laboratory in the Cécile Morgane Laboratories in the Pickus Center for Biomedical Research specializes in a technique called in vivo microdialysis allowing the measurement of very small amounts of serotonin and other chemicals in the brains of unanesthetized, behaving rats. Dr. Mokler has used this technique to examine the short- and long-term effects of drugs of abuse such as cocaine, morphine and ecstasy (XTC) on the serotonin systems of the brain of rats. He has lectured on this work nationally and internationally and published over 50 peer-reviewed papers and reviews, most on the actions of serotonin in the brain.

Over the past 10 years he has worked with Peter Morgane, Ph.D., Professor of Pharmacology in the College of Osteopathic Medicine and the Center for Excellence in the Neurosciences, on how serotonin in the brain is affected by exposure to prenatal protein malnutrition. This work was originally funded by the National Institute of Child Health and Human Development. More recently the work at UNE has been funded by the National Institute of Mental Health to investigate the relationship between prenatal protein malnutrition and attention, and its relationship with the prefrontal cortex. This work is now moving further to examine how the serotonin system develops in the adolescent brain and its relationship to behavior in adolescence.

Recently, Dr. Mokler’s interest in serotonin has led to his involvement with Hannah Kinney, M.D. at Children’s Hospital of Boston. He has studied how serotonin is altered in the brains of children who have died of Sudden Infant Death Syndrome (SIDS). The findings from this work have recently been published in the Journal of the American Medical Association (Duncan et al., 2010). This work has shown that children who have died of SIDS have lower levels of serotonin in areas of the brain critical for breathing.

Dr. Mokler’s recent findings show that children who have died of SIDS have lower levels of serotonin in areas of the brain critical for breathing.
Ionic Liquids
Amy Keirstead | Physical Organic Chemistry

Dr. Amy Keirstead’s research focuses on using physical organic chemistry and organic photochemistry to learn about the properties of ionic liquids that make them excellent materials for the construction of various nanotechnology devices, including photovoltaic (solar) cells, molecular electronics, sensors and light-emitting devices. Ionic liquids are an exciting new class of materials with extraordinary potential for use in these applications due mainly to their environmentally friendly character and their robustness under extreme conditions; for example, they are non-volatile, making them ideal for photovoltaic cells that must withstand the sun’s heat. However, despite their potential, much remains to be learned about the specific properties of ionic liquids and how they can be fine-tuned for various nanotechnology devices.

Three projects are currently underway in Dr. Keirstead’s laboratory, all of which involve undergraduate student researchers. The first project involves studying the cage effect of ionic liquids, or how readily molecules can move through the viscous liquids, a factor that is important in the design of efficient photovoltaic cells. A second area of research involves the study of photochromic spiropyran molecules that can act as on-off molecular “switches”, and how the dynamics of this photochromism are affected by the ionic medium in which the switch is encapsulated. This study is significant for applications involving molecular electronics and other nanoscale devices. The third project, in collaboration with Dr. Jerome Mullin (UNE) and Dr. Hank Tracy (University of Southern Maine), investigates the effect of ionic liquids on the photoluminescence properties of a class of molecules called siloles, which have found uses as molecular sensors and optoelectronic devices such as organic light-emitting diodes (OLEDs).

The Limbic System and Emotional Learning
Michael A Burman | Psychology

The laboratory of Assistant Professor of Psychology Dr. Michael Burman is primarily concerned with the contributions of various limbic system structures to emotional learning and memory. Recent work involves understanding the role of hippocampus, amygdala and cortical development in the ability of juvenile rats to use contextual cues to modulate emotional responding. Other interests include the role of stress hormones in emotional memory formation and the effects of various developmental insults on later emotional regulation.
From Lab-bench to Bedside: Investigating Interstitial Lung Disease

Biomedical science takes an average of seven years to reach patients as improvements in therapy or care. This gap between discovery in the lab and incorporation into clinical practice is contributed to by disparities in training and methodological approach between different scientific disciplines and clinical investigators.

The NIH research roadmap is now directed to improving “translational” research to overcome the lack of synergy and accelerate the implementation of benchwork at the bedside. Two junior faculty at UNE, Drs. LeClair and Binks, have already overcome these obstacles and formed a collaborative effort with physicians at Maine Medical Center to take their molecular and physiological science to the clinical arena.

Dr. Renee LeClair of the College of Osteopathic Medicine is a biochemist specializing in the molecular mechanisms of tissue fibrosis. Her primary interest is interstitial lung disease (ILD), a condition where healthy lung tissue is permanently replaced by fibrotic “scar” tissue. The process has numerous causes, but all result in an irreversible decline in lung function, leaving the patient with severe dyspnea (shortness-of-breath) until respiratory failure eventually causes death. After developing a transgenic mouse model, Dr. LeClair has been able to investigate the role of a particular protein, Cthrc1, in the fibrotic process. She has discovered Cthrc1 has an inhibitory effect upon fibrosis, failure of which results in an ILD-like-state in her Cthrc1-knockout mice. The capability of Cthrc1 to inhibit fibrosis gives it the potential to be used as a diagnostic biomarker and form the basis of a therapy for ILD, where currently there is none.

An essential component to determining Cthrc1’s role potential as a clinically pertinent molecule is observing its influence at the systemic level. Dr. Binks of the College of Health Professions is a pulmonary physiologist, who’s training in systemic physiology brings complimentary skill-sets to the molecular expertise of Dr. LeClair. The two young investigators have tested the progression of fibrosis in Dr. LeClair’s mice by measuring lung compliance (a measurement of the lung’s “stiffness”). Correlation of the systemic and molecular data has allowed this inter-discipline/inter-college collaboration to determine Cthrc1’s influence on the disease process at the organ level.

As the lung becomes less compliant, the ILD patient has to constantly work harder to breathe while thickened alveolar membranes in the fibrosed lung tissue decrease gas exchange and lead to disturbed blood gases. The extra respiratory work and decreased efficiency of the lung generates the severe dyspnea associated with ILD, which in turn produces anxiety and a diminished quality of life. Using functional brain imaging, Dr. Binks has recently shown the brain regions activated by dyspnea include those associated with the fear-response (e.g. the amygdala). With a growing number of ILD cases in the USA and no available cure, early detection and symptom management are more important. However, ILD is difficult to diagnose and is often confused with other pulmonary diseases. Circulating Cthrc1 levels rise during fibrosis, and so may serve as a simple and specific diagnostic biomarker of ILD.

To test the diagnostic potential of Cthrc1, Drs. LeClair and Binks have established a collaborative study with physicians, Dr. Riker and Dr. Mette at Maine Medical Center. Dr. Binks’ experience with respiratory patients and human studies bridges the divide between the genetic and molecular work of Dr. LeClair and the clinical insights and expertise of the physicians. Together, this collaborative group recently submitted an inter-institutional R21 application to the NIH to translate the molecular expertise of Dr. LeClair to the bedside of ILD patients. With the currently poor prognosis of ILD (50%-80% mortality in 5 years) such collaborative efforts linking molecular science, systemic physiology and clinical practice will hopefully reduce the translational period to below the 7-year average.
The Learning by Living Project was piloted in 2005. The program was designed and implemented by Dr. Marilyn Gugliucci and since this time, medical students have been “admitted” into nursing homes in Maine, Massachusetts and New York to live the life of an elder nursing home resident for two weeks – 24/7 – complete with a medical diagnosis and standard procedures of care. This project utilizes a Qualitative Ethnographic and Biographic research design, whereby a “culture” is observed from the researcher (medical student) living within the environment (nursing home).

Until this project, long-term care education in nursing homes was accomplished through traditional medical education methods. However, according to White (2008), “Long-term care services represent a growing aspect of our medical system that receives little attention in medical education.” Furthermore, medical student training and experiences in nursing homes are often viewed as negative, which mirrors the views expressed by the general public (White, 2008). The truth is, in our society, nursing homes receive negative attention. This project is based on two premises as the basis for medical education in nursing homes: (1) older adults residing in nursing homes are human beings deserving of good care, respect, and “community” connection; and (2) medical students can attain medical care skills including advanced relationship building skills with older adults from living the life of an older nursing home resident.

To date, the program has had a 100 percent success rate and follow-up data after five years has shown that the students/graduates of UNECOM practice medicine differently, with all ages, because of their experience of living in a nursing home.

Key factors in medical care knowledge changed by this experience are:

(1) importance of physical touch when working with patients;
(2) enhancement of communication by being at eye level with the patient, whether they are in a bed, a wheelchair, or on a treatment table;
(3) communication with authenticity and sincerity, the importance of being comfortable within and sharing that with patients; and
(4) connection with and treating the person rather than the diseases or frailties s/he presents with.

These are remarkable lessons learned within a two-week span of time and have been shown to be maintained as students continue their clinical training in medical education.
American culture and lifestyle is often referred to as “obesogenic,” characteristic of an environment that promotes increased food intake, unhealthy food choices and a reduction in physical activity. The combination of risk factors, in conjunction with genetic predispositions, contributes to the increase in obesity seen in American society (and throughout the industrial world). The fat surrounding one’s organs is now recognized to be an endocrine organ which contributes to the metabolic dysfunctions associated with atherosclerosis, metabolic syndrome and diabetes. The UNE campus is home to several researchers investigating aspects of disease promoted by obesity.

Drs. Amy Davidoff, Renee LeClair, Deena Small and James Vesenka have recently identified synergistic research components. Collectively, these investigators use state-of-the-art techniques (e.g., genetic manipulation and atomic force microscopy) to investigate cellular signaling, structure and function of processes which contribute to cardiovascular diseases and metabolic syndrome. It is clear that research within the areas of obesity, diabetes and fibrotic disorders will be integral to the development of new wave interventions. UNE researchers are on the forefront of these developments working to promote academic, as well as biomedically relevant research here on campus.

Steroid Influence on Sexual Behavior
Geoffrey K. Ganter | Biological Sciences

The brains of male animals produce sexual behavior that can be very different from that of females. For example, a male fruit fly courts a female by following her, gently tapping her, and singing a love song by vibrating one wing. On the other hand, the female fly is coy and leads her suitor on a chase and then, if he is persistent, she finally allows him to approach. Ten days later, their several hundred children take to the air to repeat the process. How do the male and female fly brains make decisions about whom to mate with and how to go about doing so?

Experiments in Geoffrey Ganter’s laboratory have shown that one important ingredient in the fly brain’s decision-making process is a steroid hormone called ecdysone. Using genetic tricks, researchers can deplete fruit flies of this steroid. Courtship situations are set up and the depleted flies’ behavior is observed. One result observed is that, deprived of ecdysone, male flies will court other male flies just as enthusiastically as they court females. This indicates that ecdysone plays an important part in the fly brain’s selection of sex-specific behaviors.

This discovery is important because it is the first indication that control of behavior has a hormonal basis in the fruit fly, as is the case in other animals such as humans. By studying steroid hormone action in this genetically powerful model organism, that knowledge can be applied to the understanding of human behavior.
PDV Seal Neurons
Frank J. Daly | Biological Sciences

Phocine Distemper Virus (PDV) causes a disease that has been responsible for more than 30,000 harbor seal (Phoca vitulina) deaths in the last two decades. The animals experience immunosuppression, respiratory and cardiovascular distress and central nervous system seizure. Histological examination of PDV seal neurons has shown that the virus causes multi-focal demyelination in the cerebral hemispheres and brainstem, but there is no supporting information on its spinal cord effects.

UNE graduate student Tom Siemens (UNE Marine Biology undergraduate, 2008), working with Dr. Frank Daly, are examining the cervical spinal cord of seals infected with Morbillivirus (PDV variant).

Comparisons with neurologically healthy seals reveal that there are no large scale changes to the white matter of the cervical spinal cord, but the spinal neurons show early signs of necrosis. Efforts to localize specific regions of PDV necrosis within the infected spinal cord should shed light on the neurological progression of this viral infection.

Morgane Musings

Dr. Peter Morgane personifies excellence in research and scholarship. After a distinguished career at the Worcester Foundation for Experimental Biology, Morgane joined the College of Osteopathic Medicine’s Department of Pharmacology in 1985 and continued his research on the limbic system. He has published extensively in his field of research and has demonstrated his generosity by giving UNE a substantial gift to build the Cécile Morgane Research Laboratories in the Pickus Center for Biomedical Research. As our most senior and distinguished researcher at UNE, we’ve asked Dr. Morgane to provide some thoughts on research.

- “The heart of moving forward in science is research. Research teaches and is the highest form of scholastic endeavor.
- Research enhances the prestige of the university – it gives the institution its national and international reputation via publication.
- Research has no value unless it is published, and essentially no publication means no research!”

Morgane’s own research has focused on limbic studies to examine the executive functions in ADHD (attention deficit, hyperactivity disorder). These include processes that organize, integrate, and influence perceptions and emotion and meet the needs and goals of the individual. He has found that:

- “Research provides the organizing principles behind the architecture of the brain and of life itself.
- Research has helped define the embodiment of emotion in the limbic brain.
- Research has shown that the medial frontal cortex is an area of the brain associated with preference and sense of self.
- Research on the limbic brain has shown that frontal brain lesions result in impulsive behavior.
- Research has shown that the prefrontal limbic cortex is the executive-decision part of the brain.”

As every starting Ph.D. student is told, “publish or perish,” and this is truly the adage under which academic research and scholarship is conducted. With over 250 publications, Morgane is a shining example to all of us of what can be achieved through dedication and hard work. What is critical, and what he has clearly taught us, is that what we publish must meet the highest standards to which we can aspire.

I have been pleased to see UNE finally moving toward becoming a Research University. It now seems we are on the right path toward reaching that goal. I am determined, as are many newer colleagues, to see that research is given the status it clearly deserves.”

Peter Morgane | Pharmacology
A successful academic research enterprise involves more than just skilled faculty researchers and space to conduct experiments. It also involves an infrastructure of dedicated professional staff who work in partnership with faculty to administer the grant funding which supports much of the faculty research at UNE. UNE’s Office of Sponsored Programs (OSP), under the Direction of Nicholas Gere, Director of Research Administration, performs that important function. The mission of the Office of Sponsored Programs is to facilitate the University’s goal of becoming a significant research institution by providing faculty with the highest quality research support services, while also protecting the University’s interests by reviewing all proposals to external funding agencies, and by initiating and implementing research related policies and procedures, providing training and outreach, and serving as a liaison between the University and its sponsors.

OSP staff also perform an important faculty development role, assisting in uncovering new funding opportunities and performing various proposal development tasks. UNE also offers faculty an opportunity to compete internally for research seed funding as part of the VPR mini-grants, a peer-reviewed program which funds several new, early stage projects annually. According to OSP Assistant Director Peter Herrick, who helps administer the program, “the VPR mini-grants are an ideal mechanism to obtain preliminary data, upon which a full-fledged application for extramural support can be developed.” OSP also assists in protecting university owned Intellectual Property by administering the UNE Intellectual Property Policy and overseeing the technology transfer function. If it’s a research administration issue, chances are that UNE’s Sponsored Programs Office staff will be assisting you.

Ensuring compliance with applicable federal and state mandates in all research functions is another core responsibility of research administration at UNE. Promoting ethically responsible research is of utmost importance in facilitating a culture of compliance. Jennifer Hutchinson is UNE’s Research Compliance Specialist. Jenny works with various compliance committees such as the Institutional Review Board for the Protection of Human Subjects (IRB) and the Institutional Animal Care and Use Committee (IACUC) to help ensure both the ethical conduct of research and the protection of the rights and welfare of humans and animals in research conducted at UNE. Educational outreach and training, for faculty and students, will be an increasing part of Jenny’s responsibilities as UNE’s research programs grow.

Working together as a team, the Office of Sponsored Programs and its staff have made it possible for faculty to greatly increase its grant funded activity. Research success isn’t only measured in dollars of course, but in the five years since the OSP was founded, the number of grant applications submitted and awards received have more than doubled, and the research infrastructure that UNE has put into place has prepared it well for additional future growth. As UNE Vice President for Research and Dean of Graduate Studies Tim Ford has remarked, “behind every successful research program there is a successful administrative support team which makes our work possible. UNE is fortunate indeed to now have such a team in place, one which is highly competent and motivated to make great strides in compliance and in supporting the faculty research mission at UNE”.

To learn more about the Research Administration function and staff at UNE, please visit the Sponsored Programs web page: www.une.edu/research/sponsored