RESEARCH VS. EDUCATION:

Professors' constant struggle at finding balance between the two

Issue 2

THIS ISSUE:

An End to Cancer

How to ACE Your Midterms

What Your Dealer Isn't Telling You

Interviews

Upcoming Events and MORE!

NUScience

Northeastern University's First Science Magazine

Letter from the Editor:

Dear Reader,

Thank you for picking up the second issue of NU Science Magazine. We've been developing and streamlining our product for the past few months and we're sure that you will enjoy the result.

The feature of this issue is a topic concerning universities nationwide; the stress put on professors to produce high-end research and its effect on their ability to teach. By interviewing local professors and colleagues, the Northeastern side of this debate was presented.

The rest of the articles in this issue are wide-ranging from developments in cancer treatment to the life and times of the common slug. There are also several updates on topics we covered in issue one, including an interview on climate change and the current status of the LHC. We are confident that you will find something to strike your interest.

We are still growing, developing, and finding our niche on campus, but to reach our full potential we need your help. If you find something you enjoyed, were interested in, or something we could fix, let us know! We value your input as we continue to publish, and look forward to presenting issue three in April. Thank you for your continued support!

Kristina Deak
President

NOTE: All sources for articles are on backlog. If you're interested in further reading, please contact us!

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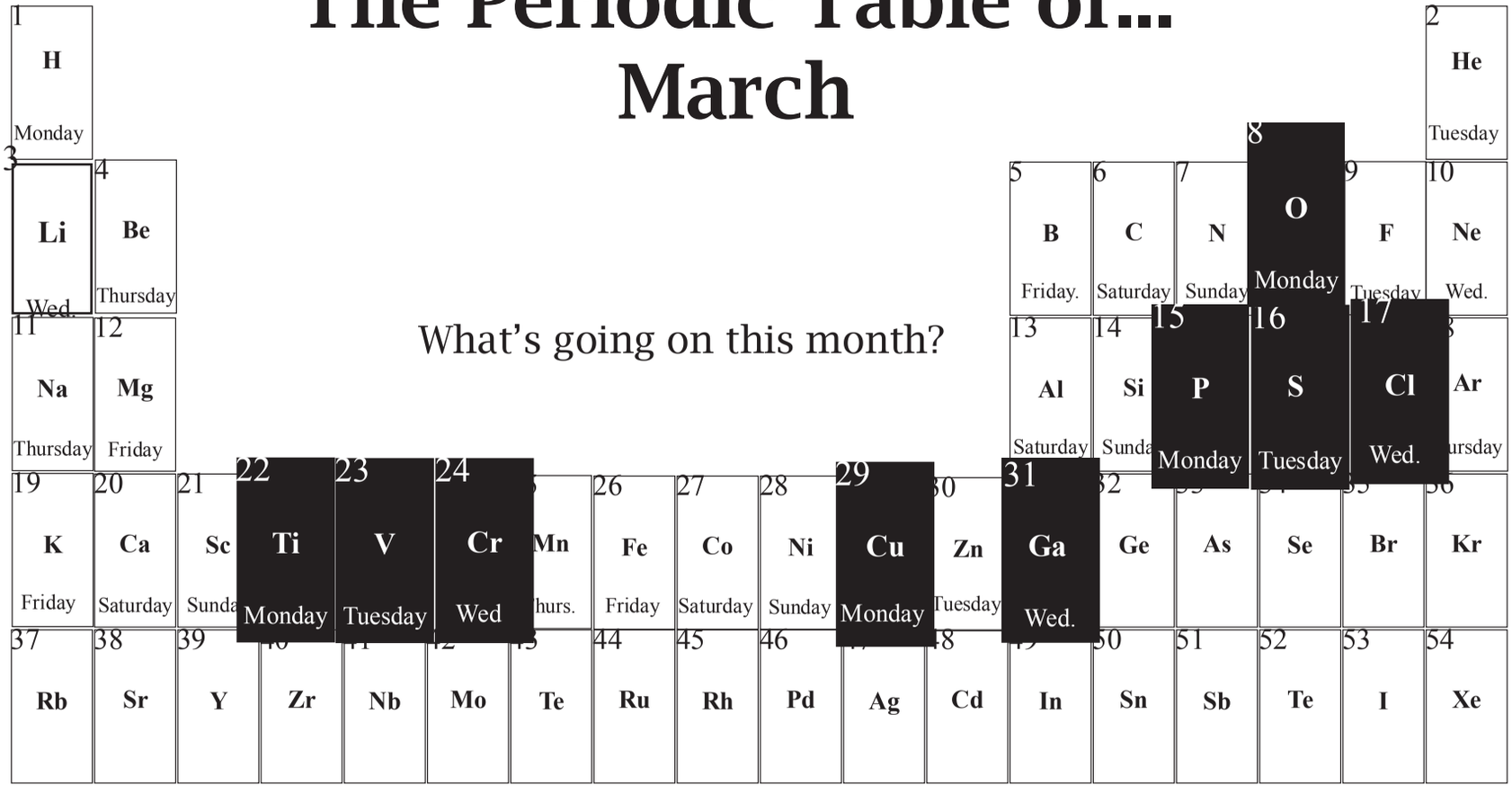
Come to our General Meetings!
Held Every Wednesday, starting March 10, at 7:30 pm in 340 CSC
Or email us at nusciencemag@gmail.com

The Periodic Table of... March



What's going on this month?

March 8 – Biology Lecture Series
"Effects of environmental stress on bivalve populations: gaining insight into climate change"
90 Snell Library - Noon

March 15 – Biology Lecture Series
"Innate immunity and disease resistance in tropical reef corals"
90 Snell Library – Noon

March 16 – Chemical Engineering Seminar
"Electrochemical detection of single molecules in nanofludic channels"
220 Shillman – 11:45 am – 1:25 pm

March 17 – NU Science Magazine General Meeting
340 CSC – 7:30

March 22 – Biology Lecture Series
"What do they do with all those ants? Nutrient limitation and food web dynamics of northern pitcher plants"
90 Snell Library – Noon

March 23 – Pharmacology Alumi Lecture
"Green Pharmacy: Strategies for reducing our pharmaceutical footprint"
Marine Science Center, Nahant – 7:00 – 8:00 pm

March 29 – Physical Therapy International Speaker Series
"Functional performance measures for ACL injuries"
225 BK – 4:30 – 6:00 pm

March 24 – Research and Scholarship Expo
Poster exposition of student and faculty research
Cabot – 11 am – 2:30 pm

March 31 – NU Science Magazine General Meeting
340 CSC – 7:30

What's new in science today?

Running Barefoot

The new upcoming trend?

Are you intending to keep your New Year's Resolution this year, or maybe get fit for Spring Break? Well it may be time to ditch those fancy customized running shoes, as research shows that running barefoot may be better for you.

Your first thought is likely to be about the pain associated with running bare feet, as our winter feet are usually bundled 24/7. It's been a while since our feet have seen the days of flip flops and sandy beaches, but if you want to prevent hip, knee and ankle injuries, running barefoot might be the trick.

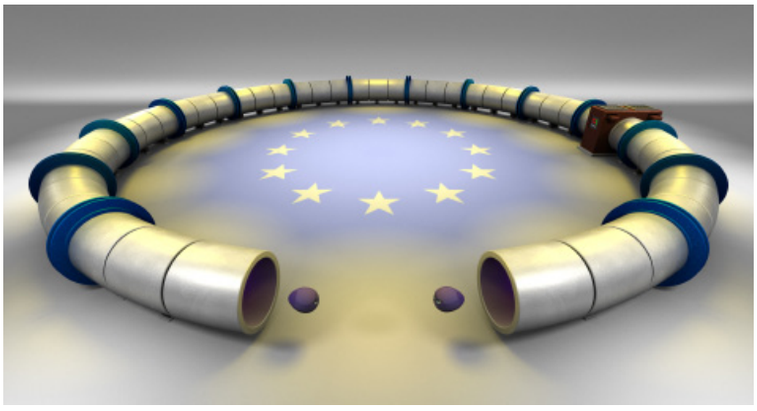
Daniel Lieberman, a Harvard University human evolutionary biology professor used 3-D infrared tracking to record and study the behavior of runners. The study found that 75-80% of runners wearing shoes land heel-first whereas those who ran barefoot land toward the middle or front of their foot. The results? Those fancy customized running shoes have significantly changed our strides, which can result in a "collision force some 1.5 to 3 times our body weight". Landing on our toes lessens the impact due to the smaller surface area coming into contact with the pavement or treadmill, thus decreasing the stress to the hip, knee and ankle.

So what does this all mean? Is it time to ditch the running shoes and hit Marino in your bare feet? Well not quite; other than the likely increase in athlete's foot among all gym goers, research hasn't concluded that it is definitely time to throw out those fancy shoes. Instead maybe it's time to become more aware of your stride, and try to eliminate the knee and ankle injuries by landing heel first. Don't know how to do this? Try slipping on a pair of high heels and going for a jog, they're destined to help you take the focus from your heel to your toe in no time.

-Nicole Smith, Finance and Entrepreneurship, 2012
Photo: iStock

The LHC Update

Recent improvements on the LHC



In the November 5th issue of NU Science Magazine, the Large Hadron Collider, the largest particle accelerator located at CERN in Geneva, Switzerland was in the process of being repaired. On November 20, 2009 the first beam started circulating around the 17 mile tunnel. Northeastern professor Emanuela Barberis was present during the first week of experimentation. Currently working on the Compact Muon Solenoid (CMS) experiment, which involves "studying the structure of matter, the most fundamental particles and the interactions among them", professor Barberis described the experience of seeing the machine at work after over a year of repairs as "a very exciting time to be at CERN." As 2009 ends, over a million particle collisions have been observed and 'reached a center of mass energy of collisions of 2.36 TeV a week ago, the largest energy achieved in a lab.' Hopes are high that by February 2010, the LHC will be ready for even higher energy collisions.

-Tara Dhingra, Biochemistry, 2012
Photo: iStock

Fun Facts: Hawaii is the only U.S state never to report a temperature of zero degrees Fahrenheit or below.

NU ChemE Car Team

NATIONAL CHAMPIONS

Northeastern University's ChemE Car team took home the 2009 National ChemE Car Championship at the American Institute of Chemical Engineers (AIChE) student conference in Nashville, Tennessee on November 8th. The eleven year old competition consists of students charged with designing and constructing a shoebox sized car that is powered by a chemical reaction. The car must carry a load up to five hundred milliliters of water and go a distance between fifty and one hundred feet. To make things a little tougher, the exact values were not disclosed until one hour before the competition. The car must also follow strict safety guidelines and have no mechanical breaking system. The winner is determined by which car gets closest to the finish line after two trials.

The Northeastern car, "The Aluminator", runs on a sodium hydroxide-aluminum reaction which produces hydrogen to power a fuel cell. The car is stopped based on an "Iodine clock reaction" in which a calculated amount of sulfuric acid and hydrogen peroxide was added to a potassium iodide solution, turning it black after a calculated amount of time. When the solution turned black, an LED light would no longer reach a receptor place on the other side of the solution, breaking the electrical circuit necessary to power the car. Using complex chemical and mechanical analysis, the students on the ChemE Car team were able to relate the distance traveled, to the time, and subsequently to the amount of reagents needed for the reaction.

The Northeastern team, captained by senior chemical engineer Patrick McMahon and advised by Professor Katherine Ziemer, were able to beat out 30 other competitors from all across the country and Puerto Rico despite comparatively modest funding. Placing in the top three for the 2nd time in the club's history, the team was able to pull off a national championship after barely qualifying for the National competition. Northeastern, with a final distance of 6.75 inches from the line, narrowly beat out 2nd place Puerto Rico by less than two inches amidst fierce Puerto Rican fanfare. All the top eight teams finished within twelve inches of the target distance of 77 inches. The load carried by the cars was 250 mL of water. The team would like to thank their sponsors Waters Corporation, Rohm and Haas, Mr. Gerald Gnerre, and Mr. Don Woods for this impressive feat of Husky ingenuity.

-James Peerless, Chemical Engineering,2011
Photos: NUChemE Car

Team Members

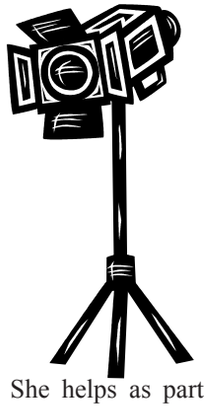
Patrick McMahon -- class of 2010 and ChemECar captain

Matt DiNitto -- class of 2012
Aaron Lamoureux -- class of 2012
Tim Lund -- ECE, class of 2010
Emma Chory -- class of 2012
Anthony Fusco -- class of 2012
Samantha Wallner -- class of 2012
Emily Nelson -- class of 2012
Michael Hess -- class of 2012
Jason Crater -- class of 2010

below. There are more than 30,000 diets on public record. A single coffee tree produces about a pound of

Spotlight on:

Heidi Pearson



Ecology is known as the "study of organisms and their interactions with the environment." Here at Northeastern, Ecology is offered as an advanced lecture course and is taught by Professor Heidi Pearson. Professor Pearson just recently joined the NU staff in July of 2009. As a new member to the faculty, she hopes to encourage students to explore the dynamic field of Ecology and perhaps think about the way that we, as humans, interact with our environment.

I sat down with Professor Pearson to delve into her personal, professional, and educational goals as a researcher and a professor.

Pearson's main research has focused on the interactions of animals with their environments. Specifically, the behavioral ecology of the organisms or in other words, what causes the animals to behave in the way that they do. Her undergraduate years were spent at Duke University in North Carolina and her graduate studies were conducted through Texas A & M University in Texas. Pearson hopes to begin marine mammal research through Northeastern, using the help of NU students under directed and independent studies. "Science is a very dynamic field and what makes it dynamic is the idea of always testing new hypothesis and collecting data. In Ecology especially, often times it allows you to go out into the field and observe animals and collect data in a way that just isn't possible in other fields. Ecology is a relatively young field and there is so much that we can do or uncover and limitless opportunities for research," says Pearson.

Pearson's love for marine life takes center stage in the research that she does at the Whale Center of New England in Gloucester, MA. In Gloucester, also where she resides permanently, Professor Pearson partakes in a long-term study of humpback whales in the Gulf of Maine. The research involves behavioral data collection and photo ID recognition of the animals. She also looks at the behavioral ecology of Atlantic White Sided Dolphins in comparison to the Dusky Dolphins of New Zealand. Pearson's research with Dusky Dolphins has continued since she traveled to New Zealand to do her graduate research a few years ago. She has also done work in Alaska with sea otters, in Senegal, Africa with chimpanzees, in Kenya with Monkeys and in Zanzibar with bottlenose dolphins.

Through her many experiences abroad, Pearson can boldly state that, "research and study abroad experiences are the best thing that undergraduate students can do." She recommends environmental field study abroad programs such as, "The School for Field Studies." She also encourages students who are interested in science to continue their education. Pearson says, "It is worth it if you are passionate about the field and want to do original research."

However, Professor Pearson's interests do not solely lie in the interactions between animals. She is also very passionate about conservation biology and climate change. She helps as part of an effort through the Whale Center to rescue stranded marine mammals on the north shore. The team responds to live and dead seals and porpoises. These strandings vary by season and occur on average about two times per week in peak seasons like the summer. The team works with the New England Aquarium in Boston and the Mystic Aquarium in Connecticut to come up with animal rehabilitation plans and procedures. As an educator, Pearson hopes to share her conservation passions with her students by increasing awareness of critical issues such as global warming. "The continuation of ecological research is so important in understanding climate change and species conservation. Only through more research can we come up with strategies to combat those two growing problems in our world. We need bright talented students to do that work," said Pearson.

Professor Pearson teaches in a way that challenges students to expand their learning, using brand new technology, articles and personal research experiences. Pearson "wants students to create real world applications and go beyond the concepts in the textbook." She challenges students to look at Ecology with the perspective that humans are at the center of this dynamic environment and we are the only ones that can create change. Our interactions with each other, the other species on this planet, and our environment, play an inevitable role on our futures. As a wonderful new asset and resource to the Northeastern community, Professor Pearson show us just that; through Ecology, it is possible to take a different perspective on the intricate processes that make up the place that we call "home."

-Andrea DeDonato, Biology, 2011

coffee beans per year. Tsiology is anything written about tea. You will burn seven percent more calories walk

Male, Female, Intersex?

If you have ever had the pleasure of taking BIO101 at Northeastern, you've probably dissected a fish or two. Once you got over the squeamish feeling of cutting the creature and had exposed its indistinguishable tan insides, the easiest part of the identification process was always determining whether your specimen was male or female. This may no longer be the case.

A disturbing trend has emerged in freshwater lakes and rivers all around the country; the prevalence of intersex fish. Intersex typically refers to having both male and female sexual characteristics. In this case, male bass have been found with oocytes, the female germ cells, within their otherwise male gonad. While only visible on the microscopic level, this discovery could have great implications as far as reproductive success of the individual and the fecundity of the species, not to mention possible implications to human health.

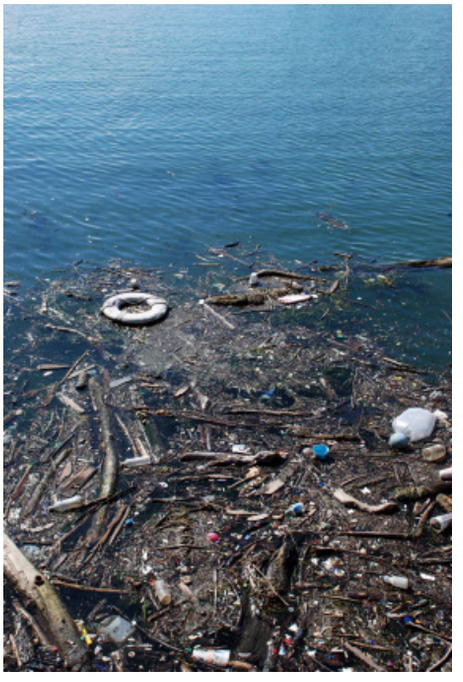
A recent report by the US Geological Survey investigated the prevalence of intersex fish in 9 major waterways throughout the United States. The results were enlightening, if unsettling. Intersex largemouth and smallmouth bass were found at 44% of the study sites, with some locations comprised entirely of intersex fish. Other species of fish were affected as well, but to a lesser degree.

What's causing this mass feminization? Though the results of the study were not conclusive, scientists are leaning towards three main culprits: wastewater treatment facilities, agricultural runoff, and hormones. Fish are extremely sensitive to chemical additives in their water. Parts per trillion of a hormone can drastically modify their sexual development. Thus, with wastewater treatment plants allowing hormones like estrogen and androgen to be released into waterways, the fish are suffering.

It has been found that exposure to a chemical like estrogen can affect the sex of the fish at any age. In fact, in a study examining intersex beetle populations, insects exposed at a later age displayed a greater severity in symptoms. It is also believed that the individuals may have a shorter lifespan, lasting five years in the case of bass, instead of the typical fifteen. Clearly, this could become an intense ecological problem if left unchecked, as a species that is not living long enough to reproduce sufficiently cannot yield a sustainable population.

However, There is room for debate. Intersex individuals have always been noted in waterways on a macroscopic scale, though in much smaller numbers. Now that scientists have been examining them microscopically as well, the population would logically increase. In addition, the fish were found both upstream and downstream of wastewater treatment plants, meaning the presence of hormones may not be the indicating factor. Agricultural runoff and general pollutants such as mercury seem to be having an effect as well. Finally, the genomic traits of the bass could not be studied, as the sex chromosomes of the species are not well documented. Until the DNA is examined, it is difficult to define just how much of a biological impact pollutants are having on the fish. Regardless, environmental agencies and ichthyologists around the country are working to determine the severity of this issue and what it means for society. The problem really adds new meaning to those placards we see lining the sidewalks throughout the city, "Don't dump, drains directly to the Charles."

-Kristina Deak, Biochemistry, 2012



es walking on hard dirt than on pavement. Snails can sleep for up to three years. A mile on the ocean and a

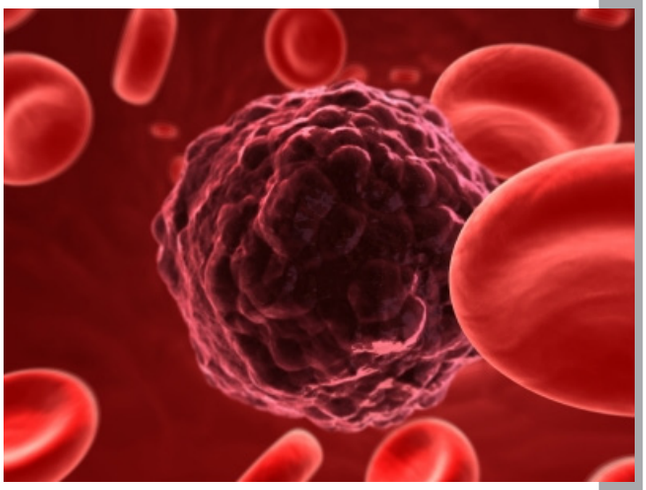
A Promising End to the Deadliest Cancer

A new development leads to a possible cure for Glioblastoma multiforme.

Every year, the Terminator, also known as the Death Sentence, calls upon 2% of Americans, which includes Senator Edward M. Kennedy. These denominations understandably have only grown in popularity, as developments for a cure for glioblastoma multiforme have come short of evolving in the past twenty years. Although the cure for cancer is ever changing and improving, this form has continued to frustrate and stump researchers for the past decades. It is regarded as the most dangerous and aggressive, and worse, the most common type of brain cancer. The survival rate is 0% for those who wish to remain untreated; those who are treated are expected to live for about a year, and only 7% of those that are treated are blessed enough to survive for three years. It's no wonder that Glioblastoma multiforme is denoted by these dreadful names.

mile on land are not the same distance. Heavier, not bigger, lemons produce more juice. The medical term fo

This cancer is especially unique because it contains hyperplastic blood cells as well as necrotizing tissue. Treatment for the cancer typically occurs in the late stages of development because the tumor can rapidly increase in size in the cerebral white matter of the brain without showing any symptoms. Metastasis of this cancer has an affinity for the central nervous system; however, although atypical, it can lead to the degeneration of the lower grade glioma, which can then extend into the meninges leading to pleocytosis of the spinal cord. X-ray photographs provide a visual of the butterfly shape the tumor takes when it infiltrates across the corpus callosum.



Presently, the standard treatment that has been able to extend the lives of the fortunate involves delivering a well-known cancer drug known as bevacizumab or Avastin® through intravenous infusion. Although the drug is successful in starving the cancer by stunting the growth of new blood vessels, the side effects are equally as cruel. The medication can cause severe bleeding in terms of coughing up blood and bleeding in the brain; 1.2-4.6% of those treated with Avastin® have lost their lives due to severe bleeding. Furthermore, an excess of protein in urine leading to kidney problems and severe high blood pressure can occur in approximately 5-18% of patients. Lastly, gastrointestinal perforation, and other side effects including headaches, back pain, tear production disorder, and inflammation of the skin are common. It is unfortunate that even so, this treatment is the most effective for the incurable glioblastoma.

Although the drug is successful in starving the cancer by stunting the growth of new blood vessels, the side effects are equally as cruel.

A Miracle in Disguise?

Super selective intra-arterial cerebral infusion of Avastin® was successfully performed on five patients at New York-Presbyterian/Weill Cornell Hospital in November 2009. This procedure entails breaking the blood-brain barrier and infusing Avastin® directly onto the area of interest. Breaching the blood-brain barrier is nearly impossible because it composed of tightly knit cells that line the capillaries and prevent any microbes or toxins from getting into the brain. There is an inefficiency associated with the current standard of delivering Avastin® into the bloodstream because the amount of drug that penetrates into the brain is indeterminable due to this barrier.

This new procedure is a harmony of new and old technologies. It is administered by inserting a hair-thin microcatheter into an artery in the groin that is flexible enough to be weaved through a maze of arteries into the brain. Surgeons are able to steer the microcatheter by watching the X-ray images on a monitor during the procedure. The question still remains, how is the blood-brain barrier broken? Mannitol® a drug used for about thirty years can temporarily open the barrier allowing infusion of Avastin.® Water molecules are extracted from the cells that line the capillaries causing them to shrink and disjoin leaving a small window of time in which there is a gap between the cells. During this five-minute time bracket, doctors inject Avastin® directly into the malignant tumor in question, or to the area where a tumor has been surgically removed prior to the procedure.

This remarkable breakthrough has several advantages. It promises new future for those who suffer from glioblastoma. Although the disease still remains incurable, once an improved drug is developed, this efficient procedure for delivering the drug to combat the cancer is available on command. Also, those who suffer from Alzheimer's disease, multiple sclerosis, and Parkinson's disease can expect improvements in the future, which can be attributed to splitting the blood-brain barrier. Luckily, it can readily serve those suffering from brain metastases if tests continue to produce favorable results.

It is now evident why medical breakthroughs occur in waves; one development can lead to another and so on. Just as the first open heart surgery was administered in the 1950's, the first pacemaker was developed and used shortly after in the same decade. Researchers are confident that the super selective intra-arterial cerebral infusion of Avastin® will have similar consequences and will lead to waves of other developments in the near future further proving that despite popular belief, things that appear impossible are never so.

-Sonam Patel, Biochemistry, 2011

erm for writer's cramp is graphospasm. Squids have eyeballs the size of volleyballs. Termites eat through

The Chemistry of Chemistry

As the month of February rolls in, we are reminded of the most celebrated and studied emotion of the human race: love. Dynamic and mysterious as it may be, love takes a front seat in art and society throughout history. One could even argue that love is the foundation of civilization and politics: either love of mankind, or the love of power and influence. Philosophers have long theorized their beliefs as to the origins of love, but only recently have scientists delved deeper into the finer constructs of the human brain to uncover scientific explanations for this peculiar emotion.

Aside from the common Valentine's mating rituals involving the purchase of flowers, chocolates, cards, and teddy bears, there is a science behind Hallmark's madness. Little does the card company know that chemical interactions between hormones and neurotransmitters in the human brain account for our feelings of passionate lust and desire. Every day, scientists are unveiling more of the neurological pathways to these powerful feelings, and they have now narrowed down the mystery to a mere handful of brain activities.

The most common neurological activity involved with human emotions for love and desire lie within the interactions of Dopamine. Dopamine is a neurotransmitter found in a wide variety of vertebrates and invertebrates and is produced in several areas of the brain associated with the pleasure and incentive systems. Dopamine is released during naturally rewarding experiences, including food intake and sex, and motivates humans to perform specific activities involved with gratifications. When a person is newly in love, they have the ability to stay up all night, take bold chances and push physical limits, all thanks to Dopamine. This potent neurotransmitter generates high energy and exhilaration, and is the underlying cause to human lust and initial passion.

If you are in a steady relationship, you may find yourself transitioning from a Dopamine-infatuation stage to an Oxytocin-subdued phase. Oxytocin is a hormone that encourages bonding and feelings of deep connection, and is secreted during bonding events such as childbirth and sexual climax. Scientists recently conducted a study in which prairie vole levels of Oxytocin were examined. Naturally these mammals have high levels of Oxytocin and they mate for life. When the scientists blocked their Oxytocin receptors, the monogamous bonds were broken and the mammals exchanged partners freely.

This relationship between hormone levels and monogamy in prairie voles can be related to humans. Neurologists believe that partners in functioning long-term relationships have high levels of Oxytocin, whereas failing relationships have lower levels. Several activities can stimulate your Oxytocin levels, like climaxing during sex, or engaging in romantic foreplay with your partner. Oxytocin plays an important role in the longevity of relationships and balanced levels should be maintained.

If you are interested in the art of seduction, you may want to reinforce your natural endorphins. Endorphins

are produced by the pituitary gland during exercise, excitement, stress, consumption of spicy foods, and orgasms. Chocolate releases small amounts of endorphins and is always a good gift for a prospective date. Psychologists have found that if you quickly exercise and then meet someone, you're more likely to be attracted to them, due to the release of your natural endorphins. So if you're taking someone out on a date this month, try going for a nerve-racking activity, like watching a scary movie or indoor rock-climbing, and you'll most likely go on a second or third date. Nice strategy, right? You can thank your body's secretion of endorphins for a good time .

-Emily Snead, Environmental Science, 2012

wood two times faster when listening to rock music. A jellyfish is 95% water. A quarter of the bones in your b

The Slug: Nature's Loneliest Cowboy

Most of us have never given a second thought to the intricacies of the common land slug. Disgusting enough to deter adoration, yet not invasive enough to warrant complete abhorrence, the slug has found a secure place in nature's D-list. Despite the honor of inspiring the Imperial unit for mass, slang for a large caliber bullet, and an adjective describing one half asleep, slug life remains a mystery to all but fans of obscure zoology. You might find yourself unable to answer the deep burning questions, such as: Why do they shrivel when salted? What's with all the mucus? And what about knockin' them slug boots?

One of the most characteristic and downright endearing features of a slug is its slime (scientifically termed mucus). The reason for the mucus is due to a slug's ocean-faring ancestry. The slug body is composed primarily of water and is prone to desiccation. For this reason, land slugs are usually confined to moist habitats, found mostly under leaves and logs, and seen in the open typically only on balmy cool nights. To keep the slug from drying out, they are covered in two types of hydroscopic (meaning they absorb water from their environment) mucus. A thick mucus covers the outside of their bodies and is used for primarily the function of keeping water in, however it also makes the slug harder to pick up by predators and is even poisonous in some species. A thin mucus is found on the underside of the foot and is the perpetrator of the infamous "slime-trail". The purpose of the slug trail is to give slugs traction and to ease locomotion. The trail is also used for slugs to identify other members of their species, a useful tool in mating rituals. Some slugs have been known to use form their mucus into strands for interesting acrobatics. They have been known to lower themselves from

Two slugs mating. The white blob is their genitalia entwined.

heights as an alternative to dropping or suspend themselves from tree limbs during sex.

The interaction of a slug's mucus with salt is an occurrence familiar with most of us who had either curious or sadistic childhoods. The slug shrivels with the application of salt is due to osmosis. Osmosis occurs when the concentration of ions outside a membrane is greater than the concentration inside. When this happens, water goes through the membrane to balance the concentration on both sides. When salt, which is composed of ions that dissolve in water, is applied to a slug, the ion concentration in the slug's outer mucus skyrockets. This causes all the water inside the slug, making up the majority of its mass, diffuses through its skin at a deadly rate. The hissing sound one may hear is simply due to the slug's fluids being sucked out nearly instantaneously. Although extremely fun to watch, the practice of salting slugs is no doubt extremely painful for our slimy friends.

A slug's habits are mostly shrouded in mystery. Most eat leafy vegetation or fungus, both dead and alive. This is why any readers familiar with slugs are probably gardeners: most vegetation is frighteningly susceptible to slug attack. Some slugs, however, have been known to digest parts of dead insects and other small invertebrates. As expected, very few animals need be wary of a slug as a predator. If you happen to find a slug on your skin, besides being mortally grossed out, fear not any bites. A slug biting you would be similar to a miniscule piece of sandpaper rubbing you. The only thing you may have to fear is a poisonous slime left by some species. By far the most interesting, bizarre, and utterly disgusting aspect of slug behavior is found in their sex lives. Slugs are hermaphroditic, meaning they possess both male and female sex organs. However, as other hermaphroditic animals are known to do, they do not self fertilize. They prefer another slug for company. Slug sex-capades consist of the protrusion of the male genitalia, which usually appears blue and translucent, from underneath the mantle while the slugs are entangled in one another. The slugs then fertilize each other by inserting their genitalia into their partner's female organs and exchanging sperm. The slugs then abruptly part ways and lay a batch of approximately twenty five to thirty eggs. For a brilliant depiction of one of the most impressive mating ritual, try typing "mating leopard slugs" into a video search engine. You may be disgusted but you will not turn away.

Although we may not always appreciate our friend the slug, they are far from boring creatures. Disgusting maybe a fair term, but they commonly keep to themselves, which is all we can ask. It may be appropriate to reconsider the slug, not as a repulsive ground-dweller, but as a stoic loner, imprisoned by its abhorrent slime covering to a meager existence. The truth is a slug's life is more interesting than we all may know, but we thank them for not forcing their story upon us.

-James Peerless, Chemical Engineering, 2011

your body are in your feet. The first human made object to break the sound barrier was a whip. At birth a

The Big

Finding Balance b

If you have ever been in a professor's office, you may have felt a sense of overwhelming claustrophobia. High shelves stacked with technical manuals, countless stacks of paper occupying every square inch of desk space, and file cabinets that look filled past capacity are all known to inhabit the tight quarters of an active Northeastern science or engineering professor. The reason behind this, as most of us know, is that all of our fulltime faculty lead a double life; that of a researcher and an educator.

It is no secret that Northeastern, the science and engineering departments specifically, has been working to accelerate its research programs tremendously in the past decade, with good reason. This coupled with the increasing competition for federal and private grants all across the country creates a hard road for the average professor-researcher. As students, many of us use our professors' research duty as a scapegoat for sub-par education. Often we mutter that a professor was hired due to his or her big-name research credentials while they maintain a blatant inability to teach basic courses. We gripe about having to schedule office hours around a professor's lab schedule. We grumble over classes being taught by adjunct faculty or graduate students when our professor is presenting research at a trade show in Croatia. However, it must be noted that it is no coincidence that all top undergraduate universities in the country are also top research institutions. Strong research at Northeastern unquestionably creates an undergraduate environment filled with faculty literate on cutting edge technology, enhances our school's mantra of experiential learning, and strengthens the Northeastern brand when we graduate. Nonetheless the question remains of whether or not the pressure put on faculty to maintain lucrative research programs is still hurting the undergraduate experience.

The administrative push for productive research is not without good cause. For Northeastern to be considered a strong undergraduate program we must be taught by professors who are leaders in their respective fields. Professors with strong research backgrounds are proven to be excited about their field and can also provide insight into what the current state of the industry. A professor on the cutting edge will undoubtedly be able to impart onto his or her students the topics that are more relevant in science today.

Undergraduate professors engaged in research also allow for students to partake in research projects while at the undergraduate level. One of Northeastern's defining pillars has always been experiential learning, with the coop program as its foundation. Students in our laboratories learning or even publishing papers gain an invaluable experience. Doing so in a highly lauded, nationally known research program furthers the value of that experience in terms of opportunities after graduation. This, of course, varies greatly by department. When looking at the Chemistry and Chemical Biology department, undergraduate research is necessary to receive a BS in chemistry due to American Chemical Society (ACS) accreditation guidelines. Therefore every student must have research in their repertoire, and the more visible and relevant that research is the better. Conversely, as in the College of Engineering, most majors require the student to seek out the professor to be involved in their research programs. Many students in these programs perform research at the undergraduate level, and even co-author publications. However, the opportunity is not guaranteed.

In theory, strong research programs allow undergraduates to get their hands on the innovative research at the institution, as usually appears to be the case. However, some professors have expressed that the administrative standards of research funding has discouraged undergraduates in the lab. According to Associate Professor Richard Melloni Jr., a ten year professor in the Department of Psychology and active professor in the Behavioral Neuroscience program, believes that undergraduates in the lab had been, to him, the most important part of his research. With the pace of research now, he states, "a lot of professors, including myself, have now taken fewer and fewer students into their laboratory because it's a bad business investment. If the University is going to examine my performance, and evaluate my performance based on how many papers I publish, how much money I have, those things and teaching [through undergraduate research] are mutually exclusive." For these professors, taking six months to train an undergraduate who will not likely be with them the next year does not make sense in an environment where time is money, and money means the future of their careers.

The ever-growing Northeastern research reputation is due immensely to the research credentials of the faculty we bring in. The hiring of faculty is currently one of the most reviled administrative duties in engineering and sciences by students. Many feel that faculty members are hired due to their research credentials without enough thought being put to their teaching abilities, or that the shortage of faculty is not being handled quickly enough because of high administrative standards. The fact is, as alluded to before, great researchers do make a great university, but of course their teaching ability must be evaluated as well. Most departments have committees that evaluate a professor's fit at Northeastern, and the specifics on that decision process remains unclear in most cases. The Department of Chemistry and Chemical Biology has an interesting approach in the hiring of new faculty. According to Professor Graham B. Jones, an eleven

human has 350 bones but only 206 when full grown. China only has one time zone. Americans eat on average

g Push

ce between Great Research and Great Education

year professor and department chair since 2003, students are an integral part of the process. The possible new hire presents his or her research at the University and student representatives from the ACS undergraduate student chapter and the Graduate Student Association (GSA) are made to be present. Professor Jones then consults these undergraduate and graduate students prior to a decision. "We want our students to love these professors," says Jones. "Maybe they have a large number of publications, but if the students don't respond to them, Northeastern may not be the right fit." Unfortunately, the hiring practices of most of the other departments remain unclear to students.

There still remains the question of how our professors function once they get here. Most administrators have expressed a need to keep their professors happy, and that they have done so successfully. There is simply a realization that comes with being a professor: you will have to teach and maintain a research program. There is absolutely nothing wrong with that assumption, and both these duties are part of a professor's job description. According to Professor Jones, "all modern professors have to juggle". Professors need to conduct research, present that research, and advise graduate students in addition to their teaching duties. Many professors have never had any problem with this.

However, a different result can be seen around campus. The state of academic science at every university across the country has become more competitive, as federal funding dwindles and the number of research programs increase. More professors are feeling the pressure to produce proposals that attract the large grants, and, from what I've gathered, the administration's attempt to ramp up research has not helped. Some faculty are leaving, some who remain have gone as far as to feel they have received a "giant middle-finger" from the administration. This disgruntled section of the faculty does not disagree with the need for research at Northeastern, or that it should be adequately funded by grant dollars. Even so, they have expressed a large amount of pressure to maintain large, high-profile grants rather than a number of smaller grants to fund their programs. Big grants mean big competition. As a result, professors often find themselves competing against private research scientists who do not have to teach, advise graduates, or hold office hours.

So how does that affect our professors' ability to teach? As one professor puts it, "You take someone like me who loves to teach, someone who loves to have a research lab, and you now start saying to that person grant funding becomes very important to your survival here. What's going to give?" The answer to that question is usually the attention given to undergraduate classes. It is not impossible to be involved in active research and be a great teacher. The amount of money that professor must bring in to remain in good standing is what makes that increasingly difficult. When questioning a professor's time devoted to your class, realize that they are being judged more on where their grant money is coming from, and less on your view of them as a teacher. When considering this issue as a whole, one must come to realize that a balance must be attained. It is an inherent necessity for Northeastern to have the best research programs it can possibly be have. The goal of having developing and maintaining Northeastern as a top tier research institution, for current students, faculty and alumni, is noble as an end. However the means by which the administration is attempting to develop our research reputation is what may ultimately damage the quality of our education. The practice of near-exclusive pursuit of high-profile grants and evaluation of professors on their ability to garner the national spotlight is causing talented junior faculty to leave and the disillusion felt by the student body. In an attempt to create a great research reputation, we must not lose our ability to properly educate our undergraduates. If the administration continues to drive great educators away from the classroom by placing a premium on grant dollars, we may lose our educational reputation and alumni loyalty.

-James Peerless, Chemical Engineering, 2011

verage 18 acres of pizza a day. A "jiffy" is actually 1/100 of a second. Beaver can hold their breath for 45

Making the Most of Memory

A Scientific Approach to Acing Midterms

The clock is ticking down. You only have twenty minutes left on your exam, and you've been staring at the same questions for thirty. This isn't fair! You put so many coffee-fueled hours into the material! You were up until 4am last night cramming! Why is your memory failing you at such an inopportune moment?

The answer involves a delicate balance of study techniques and neurological health. But before we can delve into the complexities, we must first examine what, exactly, memory is.

Put simply, memory is the ability to store and recall information. This information may be a mathematical equation, the scent of your boyfriend's cologne, the way you felt the first time you asked a girl to dance, or any number of physical stimuli. All of these memories are stored in your brain as intricate patterns of neurons. How these patterns are formed depends on what kind of information is being processed, however. You declarative memory, which consists of memories of past events and your knowledge of the outside world, is processed by the temporal lobe, the amygdala, and the hippocampus. Procedural memory, which, as the name suggests, consists of the use of objects and muscle memory, is handled by the cerebellum. It is the former that we will concern ourselves with in this article.

The process of forming these neural connections starts at sensory stimulation in a process called Acquisition. As you read over the pages of your textbook, the information entering your head enters your short-term memory (STM). STM only lasts from a few seconds to a few minutes, and it has a limited capacity (roughly seven distinct items). If you exceed the capacity of your STM, it's unlikely that you will remember the extra information. Because this form of memory is so short-lived, if you have any hope of remembering anything, the information must be converted to your long-term memory (LTM) in a process called Consolidation. Consolidation of declarative memory is signaled primarily by the hippocampus. Without a healthy hippocampus, it becomes nigh on impossible to form new memories (as is evident by the case of H.M., the anterograde amnesiac). Retrieval is the final step in memory formation, in which information is recalled. As one rehearses a memory, the neural connections are strengthened. With each rehearsal, the memory can be recalled faster and more accurately.

So what, then, are the keys to effectively creating memories that can be accurately recalled later?

Perhaps most important is preserving the health of your brain. One of the biggest, and unfortunately, most common offenders here is stress. All of our lives, we are assaulted with the idea that we need to reduce our stress levels, though few people seem to understand just how much damage stress can do to one's body. Its effects on the brain, especially, are largely overlooked.

Stress is a fantastic solution to short-term problems. A surge of adrenaline may be the difference between being hit by a car and jumping out of the way at the last moment. An increased flow of oxygen to the body will help you to fight back against a mugger and return home under your own power. Stress can even help raise your alertness enough to perform exceedingly well on an exam. However, prolonged stress will have just the opposite effect. It will suppress your immune system, making you vulnerable to illness. It can make you physically weaker. Additionally, prolonged exposure to cortisol, the stress hormone, can damage your hippocampus, making memory formation and retrieval much more difficult.

One of the easiest ways to counteract this is with exercise. In addition to relieving stress, exercise has the benefit of increasing blood flow to the brain, which means stronger neurological function. Other ways to increase blood flow (and

minutes under water. The average raindrop falls at 7 mph. The last letter to be added to our alphabet was J. A croco

thus, oxygen levels) in the brain are by eating plenty of antioxidants and B vitamins. Smoking will have the exact opposite effect, as cigarettes are vasoconstrictors, reducing the flow of blood to the brain. So stop taking breaks from studying to go have a cigarette. It's not doing your memory any favors.

Also critical to the formation of memories is plenty of sleep. This is why late-night cramming sessions the night before an exam are such brilliant displays of futility: if you don't get enough sleep, your brain cannot convert information into stable long-term memories.

Knowing all of this, the rest comes down to utilizing effective study techniques:

1. We know that STM can only hold around seven pieces of information at a time. Therefore, when trying to memorize lists, use a technique called chunking. Break it down into pieces of four to six elements. This is largely how memorizing a phone number works. Notice that we don't memorize a phone number as 5555556782. We break it down into smaller pieces and memorize it (and recite it) as 555-555-6782.

2. Use multiple senses. Reading a fact is great. Reciting it aloud afterward is even better. The more sensory information you can add, the stronger a memory will become.

3. Rehearse the information you learn the day you learn it, and rehearse it often. Without frequent recall, the neural connections you create to build a memory will quickly fade, and with it, the very thing you had tried to memorize.

4. Try to relate information back to information you've learned before. Strive for a true comprehension of the material rather than rote memorization. The more information you can incorporate into a memory, the stronger it will be.

5. Work by the eight second rule. It takes roughly eight seconds of uninterrupted concentration to start consolidating information. This means removing unrelated stimuli that will distract you. Turn off the TV, tell your friends to shut up, and log off of Facebook. All they will do is distract you, and that, as we can now see, reduce the effectiveness of consolidation.

6. Use mnemonic devices, such as sentences, acronyms, visualizations, and storytelling. All of these will help you to incorporate more senses and information into your memories, making the neural connections stronger.

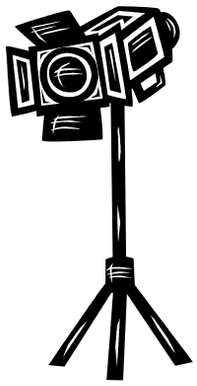
7. Keep a good attitude about studying. Things are easier to remember when you are upbeat. Negative emotions will only serve to introduce stress, which will make memory formation more difficult.

Exams don't have to be the harbinger of death that they are often made out to be. With effective study techniques and sufficient stress management, even the most daunting of finals can be tackled without a single all-nighter. Not only will your memory improve, but so will your cognitive health, your mood, and your general wellbeing. So take a deep breath and go for a walk. Your brain will thank you for it.

-Kyle Deerwester, Behavioral Neuroscience, 2013

crocodile cannot move its tongue. The hummingbird is the only bird that can fly backwards. Oysters can change

Spotlight on: Dr. Daniel Douglass



Dr. Daniel Douglass has been a lecturer in the Department of Earth and Environmental Sciences for four and a half years. I spoke to Dr. Douglass about his position at Northeastern University and his thoughts on climate change.

Q: What project(s) are you working on at the moment?
A: As a lecturer, my primary job responsibility is to be an innovative educator, so I spend most of my time working on how to be more effective as a teacher. I am not currently involved in research.

Q: Is there an agreement within the scientific community on how to approach educating the public on climate change?
A: Not that I am aware of. I recently read about some polling that showed that the percentage of Americans who believe that humans are responsible for climate change has been declining in recent years.

Q: Do you feel that arguments against climate change made by climate change skeptics are over-represented by the media?
A: I think that there are a number of studies that have shown that climate skeptics get a disproportionate amount of press coverage relative to what the scientific community feels about the validity of their hypotheses and positions. Having said that, the moment that scientists stop testing their hypotheses is the moment they stop doing science; skeptics play a critical role in science.

Q: What is the current scientific consensus on climate change?
A: The current consensus is that the planet is warming and that humans are likely responsible for some of this. Generally, the severity of the impacts of global warming increases with the rise in temperature; at a total warming of 2°C above pre-industrial values (so another 1.3°C relative to today's climate), these impacts are going to start getting serious.

Q: Do the recent "climategate" e-mails cast doubt on legitimacy of climate change research? Why?
A: I do not think it casts doubt on the legitimacy of climate change research because there are several other independent lines of evidence that show global climate change is happening. There are at least two other tem-

over 61,000 pizzerias in the U.S. Camel's milk does not curdle. It is possible to lead a cow up stairs but not down. Strawb

"...the planet is warming and humans are likely responsible for some of this."

perature compilations other than the one produced by the CRU, and at least one of these data sets indicates that the planet is warming even faster than the CRU compilation. The optical properties of CO2 gas were discovered in the 1850s and there is no data that contradicts the statement: "adding CO2 to the atmosphere will decrease the amount of energy that is radiated away from earth and cause the planet to warm". However I think this does demonstrate the need to make data more publicly available and for greater transparency in some parts of the peer-review process.

Q: What is the sentiment in the scientific community regarding these leaked e-mails?
A: I do not want to speak for the broader scientific community, but my first thoughts were as follows: a) this looks really bad; b) I hope that they have not been faking the data; c) wait, there is all this other independent data that shows the same thing so even if they were making this up it still would not change the overall picture; d) I hope that the CRU quickly gets permission from the contributing national meteorological offices to release all of the data that is used in these compilations to the public so that people can convince themselves that there has not been any inappropriate manipulation of data (most of it is currently available, but not all of it).

Q: Why does climate change break down along political party lines, isn't this a problem for everyone regardless of their political affiliation?
A: I am not sure, but I think it has to do with the implications of climate change rather than the science itself. Reducing GHG emissions is only going to happen if someone develops a Star Trek-like energy source (i.e. makes a lot of power at low cost), or there is a large amount of government intervention to change the energy infrastructure of our country (and others). Republicans are generally more averse to government intervention, whereas Democrats are less concerned about this. I think that this then translates into whether people "believe" or not.

Q. Some politicians such as Al Gore have taken on climate change as their own personal mission, is this helpful to climate scientists or does it politicize their research?
A. Al Gore helped with his movie by basically getting the science right, but he also oversimplified one complicated topic, which led to quite a bit of press about the flaws of the movie. He did not get it wrong, but kind of glossed over some of the important details.

Q: What are some of the effects of climate change that we are experiencing here in Boston already?
A: Sea level is rising about 3 mm/yr. Temperatures are warmer (about twice the global average). The lilacs in Arnold Arboretum used to bloom on Mother's Day weekend, now it is a week or two early.

Q: If things remain status quo, how is climate change likely going to affect Boston in the future?
A: Regional climate modeling is tricky, but one study I read suggested that we will inherit the climate of Atlanta, GA by the end of the century.

-Sanel Selimovic *Photo: iStock*

Strawberries contain more vitamin C than oranges. Elephants sleep only 2 hours a day. Horseback riding can

REVIEW

What's popular, what's

Nuclear Pharmacy: Providing Innovative Treatments

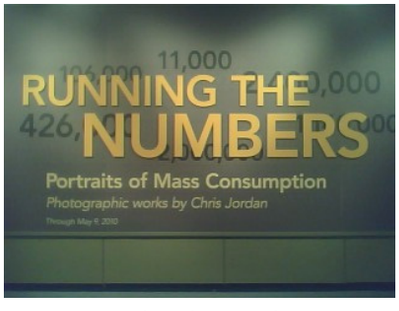
Daniel Yokell, Pharm D., RPh, and NU alumni, visited in December to give insight into the world of nuclear pharmacy. Yokell completed co-ops with both Brigham and Women's Hospital of Radiopharmacy and Molecular Insight Pharmaceuticals.

Yokell defines nuclear pharmacy as "a specialty practice of pharmacy which compounds and dispenses radioactive material for diagnostic and therapy procedures". While this description alone can seem quite intense, the training required further proves the field's demanding nature. Yokell completed an authorized user training course through the Nuclear Regulatory Commission (which includes 200 hours of course work), 500 hours of supervised training in the nuclear pharmacy setting under an authorized Nuclear Pharmacist, and also has his Pharmacist License. He completed most of his advanced practice at Duke University's Medical Center of Radiopharmacy and the University of California at San Francisco.

Yokell also discussed the differences between a commercial nuclear pharmacy (such as Cardinal and GE Healthcare) and a hospital nuclear pharmacy (such as MGH and Brigham and Women's). Commercial nuclear pharmacies are staffed by several pharmacists, techs, and support staff. Hospital pharmacies are run by a significantly smaller staff. In order to meet the demand of sending radiopharmaceuticals to various clinics, commercial nuclear pharmacies are run 24 hours a day. Hospital pharmacies supply a great amount of patient care due to the direct dispensing of the radiopharmaceuticals, which can be given as therapy for cancer. There are bone seeking agents for treatment of bone metastasis, as well as 131Iodine for thyroid cancer, hyperthyroidism, and Graves' disease.

Working full-time with nuclear substances can be a dangerous job, but all nuclear pharmacies are closely monitored by Radiation Safety. The pharmacists work behind protective shields and practice other safety techniques to ensure that radiation scores stay low. Overall, Yokell enjoys the research that his job entails and plans on staying in the radiopharmacy field.

-Sara McKechnie, Pharmacy 2014



Running the Numbers: Portraits of Mass Consumption

Running the Numbers: Portraits of Mass Consumption is an art exhibit located at the Museum of Science. Jordan's goal is to visually portray the statititcs reflecting American's mass consumption of resources. An art exhibit in a science museum may seem a little bizarre, but Chris Jordan's photography "breathes life into the numbers." The large photographic inkjet prints depict various forms of waste in the United States from plastic bottles used per minute to the number of cell phones retired in a day. Cans Seurat mimics Georges Seurat's 1884 A Sunday Afternoon on the Island of La Grande Jatte except the spots making up the larger image are 106,000 aluminum cans, the amount used the U.S. every 30 seconds. Gyre is an ocean wave made up of 2.4 million pieces of plastic the same amount of pounds of plastic that enter the oceans every hour. Be prepared to think and reflect upon the vast scope of man's impact on our world. There is even a response box to describe your personal feelings about Jordan's artwork and the statistics they reflect. Though his artwork is expressive and inspiring it offers no way to solve the problems. This exhibit is available to view at no additional cost to the exhibit hall fee and will be on display until Sunday May 9, 2010.

-Tara Dhingra, Biochemistry 2012

improve your posture. There is a town called "Big Ugly" in West Virginia. Cows give more milk when they liste

ws:

s cool, and what's happening!

MOVIE REVIEW:
Documentary *Taking Root*

Taking Root tells the tale of one woman's journey to empower her country both environmentally and politically

The documentary Taking Root, produced by Alan Dater and Lisa Merton, tells the compelling story of Wangari Maathai, the first East African woman to receive a Ph.D and the founder of the highly successful reforestation initiative, the Green Belt Movement, in her native Kenya. It chronicles the history of deforestation in Kenya, dating back to the beginning of British colonialism in the late 1800s, and continuing through Kenya's independence in 1963 and even today. Maathai has been a well-known leader of the reforestation movement and a very controversial figure in Kenya for many years, and through her perseverance, this movement has succeeded in planting not only trees, but also ideas.

Although the British departed Kenya in 1963, the unsustainable agricultural practices they had instituted still remained. Smaller, self-sufficient plots containing several different food crops and respect regarding natural boundaries of forests had been replaced by larger plots growing single cash crops, transforming previously lush, fertile villages into monotonous landscapes of tea or coffee plantations. Maathai saw her fellow Kenyans struggling to provide for their families as resources dwindled, and realized that all these problems came down to one thing—trees. "Let's plant trees!" she exclaimed to the women. "But we don't know how to plant trees," the women would reply. Maathai's revised answer? "Let's learn to plant trees."

And learn they did. The movement began to spread, with new tree-planting groups of women cropping up all over Kenya; however, the trees were not the only things growing. The women in these villages were suddenly empowered. They were independently making a difference in their communities, and seeing the results spring up right before their very eyes. The Green Belt Movement was seeing its first successes, however it would not progress unchallenged for long. As Maathai began to gain greater renown, she also became the target of efforts by the government, at that time ruled by the authoritarian Moi regime, to crush any resistance to their own policies and to engrain gender roles in Kenyan society. She was hailed as a national hero as she fearlessly endured great personal danger in order to further the causes she believed were imperative to the growth of Kenya—planting trees and empowering women.

It was in this way that the Green Belt Movement became much more than planting trees—it became a form of resistance against the corrupt, authoritarian regime in power at the time. Maathai gave both men and women hope, confidence, and belief in their own independence, giving them the strength to fight for what they believed was right. The organization began to offer seminars in Civil Education and the Environment. This encouraged people to think for themselves and ask questions in order to solve the root of the problem, rather than simply complain about the symptoms of the problem. Maathai led—and still leads today—through example, teaching women all over Kenya that they can indeed make a positive difference in their own community.

The documentary itself is beautifully done, juxtaposing serene, benevolent images of lush Kenyan jungle with stirring footage of civilian protests and tense, often violent standoffs between protesters and government soldiers. Much of this footage is filmed from a shaky perspective, the camera often dropping towards the ground as if the cameraman himself suddenly had to run from the very violence he was recording. Rather than detract from the viewer's cinematic experience, however, this only enhances the viewer's understanding of the tension of the situation. The most impressive scene in the film, however, was striking not due to the skills of the cameraman, but due to the ferocity of Maathai herself. In this particular scene, she speaks to a set of soldiers blocking entrance to a forest. Her voice is loud, passionate, and even slightly threatening; her eyes burn with fiery passion for her people, their trees, and the desire to bring the two together anew. In this moment, she exemplifies the Green Belt Movement and its link between democracy, peace, and the environment, and embodies one of her own quotes: "You cannot enslave a mind that knows itself."

-Rebecca Willett, Anthropology 2013

ey listen to music. Almonds are part of the peach family. The bullfrog is the only animal that never sleeps. Gi-

What Your Dealer ISN'T Telling You

Would you install a virus on your brand new Macbook? Would you text in the shower with your beloved BlackBerry? What about letting the new puppy play fetch with your iPod? Didn't think so. But then, why would you inflict worse damage on yourself? Whatever your favorite MO - snort, swallow, pop, chug, inject, or inhale -the effects are undoubtedly detrimental. The "invincible" college student is tragically unaware of the long-term lows of their short term high.

Regardless of what you thought, your body is not immune to or invincible against the affects of long-term drug use. Unfortunately, nearly half of the 5.4 million college students believe they are immune, and abuse drugs or binge drink at least once a month. This statistic, by the national center on Addiction and Substance Abuse (CASA) at Columbia University, is only a small part of a growing problem. The numbers are shocking: 22.9% of college students meet the medical definition for alcohol or drug dependence, compared with 8.5% of the general population. In 2005 a study found that 83% of campus arrests involve alcohol and that students who abused prescription medication were 5 times as likely to report past-year drunk driving compared with other survey respondents. This behavior is nothing new on college campuses, but it is becoming increasingly dangerous. Use of almost all drugs, legal and illegal, is on the rise. In addition to the physiological effects, other consequences for students have become more severe such as increased arrests, risky sexual behavior, and ruined relationships.

Almost every college student, regardless of academic standing, is aware that drug and alcohol abuse is unhealthy and in some cases, illegal. The use of drugs by a significant percentage of college students despite the awareness of their own wrongdoing points to three dangerous undercurrents. The first is quite obvious: most students believe that the benefits from their substance abuse outweigh any potential or "claimed" negative effects. The second is the assumption that all college students, past and present, get high and drink incessantly, yet still turn out all right. This assumed collegiate tradition or "right of passage" will be a rude awakening to students as their bodies react to the years of abuse. The third, and most prevalent problem, is the ignorance of students towards what the real repercussions are of such rampant and increasing substance abuse. The most commonly abused drugs on a college campus are alcohol, marijuana, and mental stimulants such as Adderal and Ritalin. While most know that these drugs are bad, they do not know what exact risks they are taking in exchange for their intoxication, high, or focused state of mind.

You booze you lose

C2H5OH, or ethanol, is the specific alcohol found in the plethora of intoxicating beverages readily available to college students. Alcohol abuse is more prevalent than expected because most drinkers do not see themselves as abusers. Alcohol abuse, or binge drinking, is generally defined as having more than 5 standard drinks (male) or 4 standard drinks (female) in two hours. In 2001 22.8% of students reported binge drinking three or more times in the previous two weeks, far above the definition of abuse. The average student is well versed in the short-term effects of alcohol at moderate levels: reduced inhibition, loss of muscle control, memory loss, and nausea. At higher levels (above .40 BAC) alcohol can cause stupor, a lack of critical cognitive function, or even coma, which can lead to respiratory paralysis and death. When compared to the more likely long-term effects of alcohol, these short-term effects seem rather forgiving. Chronic alcohol abuse leads to cardiovascular disease, malabsorption, chronic pancreatitis, liver disease, and cancer. Alcohol accounts for 1 in 25 deaths world-wide and 5% of years lived with disability are due to alcohol consumption. It is also

raffes can lick their own eyes. The "ZIP" in ZIP code stands for zone improvement plan. On average you'll spend a ye

surprising to note that alcohol kills 6 ½ times more young adults then all other illicit drugs combined according to the National Center on Addiction and Substance Abuse. Regardless of these health risks, students continue to consume alcohol at higher rates each year. Even those who drink on occasion should be advised that the long term effects of a legal record due to drunk driving carries a burden of its own.

“Studies on student stimulant use are alarming. As many as 25% of students are currently abusing amphetamines in colleges nationwide.”

The High Cost of a High Lifestyle

Marijuana is the most commonly abused illicit drug in the United States. It stems (literally) from the Cannabis sativa plant and is usually smoked or eaten. THC (delta-9-tetrahydrocannabinol) is the active chemical in marijuana that binds to the membranes of certain neurons and causes a cascade of reactions which ultimately results in the high experienced by the 33 % of college students who use the drug. This “high” replicates the brain’s reward system by stimulating neurons to release dopamine which is also released in response to food, drinks, and most other illicit drugs. The short-term effects vary; they are tachycardia, intense sensation, increased hunger and thirst, anxiety, and after the euphoria passes, depression. Short-term effects of smoking marijuana begin immediately and usually last about 2 hours. When eaten, the effects begin more slowly and last longer. Smoking deposits many times more THC into the bloodstream then does eating or drinking the drug. Contrary to popular belief, there are negative long term effects associated with chronic marijuana use, some even more serious then the long term effects associated with cigarettes. Constantly smoking the drug can have the same effect on the respiratory system as cigarettes: daily cough, phlegm production, frequent acute chest illnesses, increased lung infections, and increased tendency to obstructed airways. On the other hand, according to the National Institute for Drug Abuse, marijuana has 50 percent to 70 percent more carcinogenic hydrocarbons than does tobacco smoke. This fact, verified by the DEA, leads to increased cancer of the respiratory tract and lungs, which accounts for more death than any other type of cancer in men and women. In 2005 lung cancer accounted for more deaths than breast, prostate, and colon cancer combined. The legal implication associated with marijuana is far more severe than that of alcohol; therefore, occasional users are not exempt from its negative effects. Marijuana is commonly associated with many other problems for students resulting from an obsession with the drug that leads to consistent truancy, ruined relationships, and a pathway to more serious drug use.

Focus Pocus

Amphetamines, or psychostimulants, are a group of drugs that stimulate the central nervous system by also elevating dopamine levels. Essentially, they act by speeding up messages going to and from the brain and body. These drugs are generally prescribed to patients suffering from a chemical imbalance in the brain commonly known as ADD. Studies on student stimulant abuse are alarming, as many as 25% of students are currently using the drug in colleges nationwide. The prevalence of stimulant abuse such as Adderal or Ritalin is due to the ease of getting prescription drugs on a college campus full of students from different health backgrounds. The competitive nature of graduate schools and job markets are forcing students to seek alternatives in study habits, and most turn to amphetamine use. Even small doses of amphetamines can quickly cause increased wakefulness and physical activity, decreased appetite, tachycardia, arrhythmia, hypertension, hyperthermia, convulsions, and sometimes death. The cardiac effects of amphetamines are the most dangerous and can be exacerbated when combined with energy drinks such as red bull, which is very common with students. Long-term effects of chronic amphetamine use are severe with a very high rate of addiction. Chronic use can eventually lead to anxiety, insomnia, mood disturbances, violence, hallucinations, and depression which sometimes last for years even after ceasing drug use. Interestingly, stimulant abuse is higher among competitive colleges, colleges in the northeast, and with students earning lower grades. Students with a GPA of 3.0 or lower are twice as likely to use amphetamines when compared to those with a GPA of a B+ or higher. Recently, many students have begun an amphetamine regiment to lose weight due to the appetite suppression. A few lost pounds are not worth a lifetime of cardiac conditions. Unfortunately, these students have a healthy fear of a bad grade and its affect on their future, but an unhealthy trust in amphetamine use to compensate for any perceived gaps in their ability to perform.

So go ahead and visit virulent websites on your laptop, use your phone in the shower, and let the dog chew up the iPod. Those devices are replaceable, your body is not.

-Samir Berry, Behavioral Neuroscience 2010

Photo: iStock

nd a year of your life looking for misplaced objects. A ball of glass will bounce higher than rubber. Chewing gum

Co-op HORROR Story of the Month

And you think YOU'VE been through the worst? Read what a fellow Northeastern student experienced- it may make your story seem not so bad...

Imagine you're a bright-eyed, soft-minded little sophomore chemical engineer, still licking your wounds from organic chemistry and conservation principles, about to start your first coop to finally see a reward for your toil. You start work at a small contract pharmaceutical lab, turning down more lucrative offers in a scrupulous attempt to get some much-promised experience in small-scale pharmaceutical manufacturing. In attempting to hone your engineering skills, you learn your first lesson in business: a contract pharmaceutical lab manufactures only if it has contracts to do so. Suddenly, you find yourself whisked away to the drab world of analytical chemistry; mole-like people hunched over computers, programming HPLC runs and cutting hundreds of rubber stoppers to boil in solvents. You then learn your second rule of business: a contract pharmaceutical lab analyzes only if it has contracts to do so. You then find yourself confined to a small room, washing beakers and writing an SOP for the dishwasher. You're only initiative has been to discover a more efficient way to dry solvent bottles. You now pursue a minor in materials science.

I'm a clumsy kid. If there's anything that shouldn't be broken, I'll break it, anything that shouldn't be spilt, it's on the floor as soon as I enter the room. So it's no surprise that my first week of co-op yielded an awkward story of epic fail proportion. I was preserving a water sample with nitric acid in the fume hood, when my nose began to itch. Thinking nothing of it, I rubbed it with the back of my gloved hand and went on with my work. Two seconds later it began to burn. Of course! I had spilt some of the acid on my gloves, and then winningly transferred it directly to my skin. Needless to say, I sported two beautiful red burns on my nose for about a week everyone I encountered, including my new bosses, probably thought I was a meth addict. Wonderful first impression.

I had interviews with several pharmaceutical companies in the same week last semester. I was feeling pretty confident in interview number three, until I noticed the strange look the staff were giving me. Turns out I was ranting about how interesting I think Alzheimer's research is and their primary focus was in skin disorders. I had prepared for a different interview accidentally! Needless to say, I never got the call back.

Have a co-op horror story? Break the most expensive piece of glassware in the lab? Forget how to perform a dilution in front of the lab manager? Bomb an interview? We want to hear about it! Submit your story of 100 words or less to nusciencemag@gmail.com. All stories will be published anonymously.

Photo: iStock

while peeling onions will prevent you from crying. Pigeons have been trained by the U.S. coast guard to spot p

TOP 10

SCIENCE PICK-UP LINES

February is the Hallmark-proclaimed month of love. In honor of this, NUSci brainstormed the top ten pick-up lines of all time. Use liberally and enjoy the results of your dapper lingo.

1. I wish I was your derivative so I could lie tangent to your curves.
2. You must be a carbon atom because every part of me wants to bond to you.
3. You must be in the middle of cytokinesis cause you have some great cleavage.
4. I wish I was adenine so I could get paired with U.
5. I want to screw you like I was James Watson and you were Rosalind Franklin.
6. I see biologists never saw you before they claimed the Y chromosome was shrinking.
7. Wanna get under my beta sheets and see my alpha helix?
8. You're so cute you make my zygomaticus muscles contract.
9. Hey baby, will a little more alcohol catalyze this reaction?
10. Why don't we get looped and go streaking?

Photo: iStock

o spot people lost at sea. A hummingbird's heart beats 1,400 times a minute.


EXIT