



Integrative Physiology

University of Colorado
Boulder

Department
Newsletter

IPHY

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Special points of interest:

- CU Boulder is ranked #14 worldwide for scholarly impact of journal publications
- The Institute of Medicine concluded that, "All undergraduates should have access to education in public health"
- The Health Professions Residential Academic Program (HPRAP) opened its doors this academic year to 100 freshmen

Inside this issue:

Public Health Certificate	2
Health Related RAP	3
People Updates	4
Kudos to Faculty and Students	9
Graduating Students	11
Many Thanks	12

A Few Words from the Chair — Roger Enoka

And so we have completed yet another academic year. Our Spring graduation ceremony was held in Macky Auditorium on May 10, 2013. Approximately 2,000 people attended the ceremony, which included most of the students in the graduating class: 220 students received a BA degree, 7 students graduated with BA/MS degrees, 11 students were awarded an MS degree, and 4 students were recognized from completing a PhD degree. Five of our undergraduate students graduated with honors and 19 achieved distinction (GPA ≥ 3.75). The accompanying photo (taken by Jeff Gould) shows the faculty on the stage at Macky as our Professor Russ Moore, who is also the Provost and Executive Vice Chancellor for CU Boulder, was delivering the closing remarks for the ceremony. As exemplified by the pioneers who established CU Boulder, Provost Moore's key message to the graduating students was to develop a vision and a plan, to persevere in achieving this goal, and to work collaboratively toward your goal.

There were several changes in our faculty during the 2012-13 academic year: Dr. Chris

Link began as an associate professor, Dr. Todd Gleeson returned to the teaching faculty after serving as Dean of the College of Arts and Sciences, Ms. Molly Welsh began as an instructor, and Dr. David Norris retired from the department. Our current faculty roster comprises:

- 1 College Professor of Distinction
- 9 Professors
- 8 Associate Professors
- 4 Assistant Professors
- 3 Assistant Research Professors
- 3 Senior Instructors
- 6 Instructors

Two of our assistant professors, Drs. Matt McQueen and Chris Lowry, underwent three mandatory levels of review (department, college, and university) and were recommended for promotion to the rank of associate professor with tenure. **Matt McQueen** is an epidemiologist and proud CU alumnus who joined the department as an assistant professor in August 2009. After receiving a BA from CU (1991-1996) Matt received an MS in public health from the University of Washington School of Public Health (1998-2001) and a doctoral degree in epidemiology from the Harvard School of Public Health (2001-2005). He





then stayed on at the Harvard School of Public Health as a postdoctoral fellow in Biostatistics (2005-2006). Matt is engaged in translational research, which is

research that aims to translate scientific discoveries into population health impact. He approaches scientific questions in an integrative and collaborative manner focusing on the development and application of methodological tools to advance our understanding of human disease from genes to populations. Areas that define his research include the epidemiology of obesity, psychiatric disorders (including substance use), and neurologic disorders. Matt also teaches the graduate-level advanced statistics course for the department and is working on the development of new public health course offerings on the CU Boulder campus.

Assistant Professor **Christopher Lowry** (above right) is a neuroendocrinologist who joined the department as an assistant professor in August, 2007 after completing a PhD in zoology at Oregon State University (1995) and a postdoctoral fellowship (1995-2002) and an appointment as a Research Fellow (2002-2006) in behavioral neuroendocrinology at the University of Bristol in the UK. He studies the mechanisms underlying stress-related physiology and emotional behavior, with a particular focus on the role of pathways that involve the neurotransmitter serotonin. Dr. Lowry uses an integrative physiology approach to understand the pathophysiology of stress-related disorders, including anxiety and affective disorders, such as major depressive disorder. Currently, Dr. Lowry is focusing on harnessing the power of sensory physiology for the prevention and treatment of stress-related disorders. In one of his most impactful studies, Dr. Lowry identified a subpopulation of serotonergic neurons that was excited by the anxiety- and stress-related neuropeptide corticotropin-releasing factor. He has found that serotonergic neurons have diverse functional properties and has provided evidence that different types of serotonergic neurons appear to (1) facilitate anxiety, (2) inhibit anxiety-like responses, and (3) mediate antidepressant-like effects.

Drs. McQueen and Lowry represent the breadth and quality of the scholarship performed by our faculty, which contributed to CU Boulder being ranked number 14 worldwide for scholarly impact of journal publications (<http://www.colorado.edu/news/releases/2013/05/13/cu-boulder-ranked-no-14-worldwide-scholarly-impact-journal-publications>).

Public Health Certificate by Matt McQueen

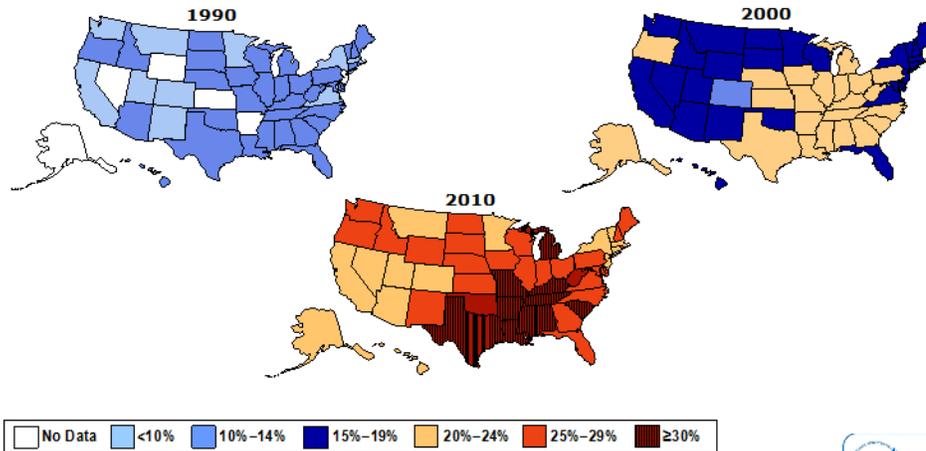
Public Health is a diverse and interdisciplinary area that is focused on improving the health of communities through education, promotion of healthy lifestyles, and research for disease and injury prevention. In a 2003 report entitled, *Who Will Keep the Public Healthy? Educating Public Health Professionals for the 21st Century*, the Institute of Medicine concluded that, "All undergraduates should have access to education in public health". Subsequently, the Association of American Colleges and Universities, Association for Prevention Teaching and Research, Centers for Disease Control and Prevention (CDC) and Association of Schools of Public Health collaborated to launch the *Undergraduate Education for Public Health* initiative.

Despite undergraduate demand on campus, CU Boulder does not currently offer any organized curriculum in the public health sciences. Providing more formal public health education at CU Boulder would prepare students for careers in public health, health professions, business, law, international affairs, environmental sciences, engineering, and other areas where the health of communities and populations is relevant. Dr. Matt McQueen from the Department of Integrative Physiology has requested that the CU Boulder campus offer a Public Health Certificate.

This certificate would include core undergraduate coursework such as Introduction to Public Health and Introduction to Epidemiology as well as a broad and flexible elective course offerings from throughout the CU Boulder campus. Additionally, CU Boulder would expand its Study Abroad and Internship opportunities to include those that focus on public health. As our world becomes more interconnected, the role of undergraduate education must adapt. One strategy used at CU Boulder and other institutions has been to extend programmatic opportunities beyond the traditional boundaries of academic departments. Public health, by definition, represents a diverse and interdisciplinary field that spans multiple traditional academic departments and units. Through a public certificate, students would have the opportunity to learn how the health of communities and populations is intricately related to their primary fields of study in the biological, behavioral, and social sciences. Dr. McQueen and others are excited about the prospect of bringing public health curriculum to the Boulder campus and are hopeful that it will be implemented within the next year or two.



Obesity Trends Among U.S. Adults



Source: Behavioral Risk Factor Surveillance System, CDC.



Health-Related RAP by Todd Gleeson

The Department of Integrative Physiology, the College of Arts and Sciences, and CU Housing and Dining Services have collaborated on the creation of a new residential program designed for students with interests in research or clinical careers in the health professions. The Health Professions Residential Academic Program (HPRAP) opened its doors this academic year to 100 freshmen (below left), approximately 1/3 of whom are IPHY majors, and is directed by IPHY professor Todd Gleeson with assistance from Program Assistant Nona Ainslie (below right).



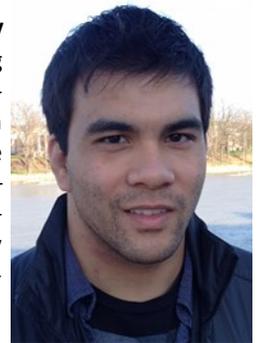
The HPRAP offers small (<20 students) introductory courses for Integrative Physiology and other life sciences majors in the residence hall. Coursework offered by the program in its inaugural year included introductory sequences in chemistry, biology, philosophy, writing, psychology, medical ethics, and other topics. The program also offered chemistry and biology lab sections, held on campus. In addition to its curricular offerings, the HPRAP offered a year-long selection of extracurricular activities intended to build community, improve academic success, and reinforce the academic theme of the program. HPRAP also collaborates closely with the Preprofessional Advising Office, a unit directed by IPHY professor Anne Bekoff.

In 2013-14, the HPRAP will move from Cheyenne Arapaho Hall to its permanent facilities in Kittredge West Hall. Kitt West was closed this year while Housing renovated the facility to include classrooms, faculty offices, study spaces, a faculty apartment, and improved dormitory facilities. HPRAP will expand to 175 students, including approximately 25 returning sophomores. The program will offer approximately 22 different courses during the academic year, including Integrative Physiology's popular Anatomy and Human Physiology courses. The HPRAP will also enjoy the presence of Brian Dombay, M.D. and his wife, who will occupy the faculty apartment in the hall. Dr. Dombay is an orthopedic surgeon with specialty interests in sports medicine. He will be offering medical and clinical programming to HPRAP students during the academic year to complement the academic offerings. The HPRAP is an excellent start for Integrative Physiology majors as they pursue their CU studies, and the department anticipates that the health professions residential academic program will serve even more IPHY majors as the program grows over the next few years. To learn more, visit the program's website at hprap.colorado.edu or on Facebook, <http://www.facebook.com/HPRAP>.



People Updates

After graduating with a degree in integrative physiology and molecular, cellular and developmental biology, **Tony Magno** (BA 2012) began working with the Colorado Area Health Education Centers (AHEC). Tony has been working with the Colorado AHEC to identify and support healthcare pipeline programs that help underrepresented and disadvantaged students from Colorado enter the healthcare workforce. In addition, this summer he will be a Team Leader for the CREATE Health Scholars program, a one month intensive program designed to make undergraduate students more competitive for professional school applications. He is also the Coordinator of CU-UNITE, an academic track at the Anschutz Medical Campus for medical, physician assistant, and nurse practitioner students interested in pursuing a career in urban/underserved medicine. Tony has been set on a career in medicine, and is very excited to be moving with his daughter and partner this fall to Rochester, NY, where he will pursue a medical degree at the University of Rochester School of Medicine and Dentistry.



In addition to a degree in integrative physiology, **Sarah Housman** (BA 2012) graduated with Certificates in Neuroscience and the Study and Practice of Leadership. As an undergraduate at CU, Sarah enjoyed being a part of the CU Club Tennis Team, Women's Chorus, and Pre-SOMA, a club for students interested in osteopathic medicine. She also became a member of Health Outreach for Latin America, a non-profit organization that works to serve the health needs of the Latin American community both at home and abroad. This grass-roots organization has had such a large, positive influence on her life and she is grateful for the opportunities it has given her. After graduation, she began working as a medical assistant at a dermatology clinic in the area. It has been rewarding to apply some of the knowledge learned as an undergraduate to working with patients! In July she will begin medical school at Rocky Vista University College of Osteopathic Medicine in Parker, Colorado. As an osteopathic physician, she hopes to incorporate both Eastern and Western forms of medicine in order to practice a preventative, holistic approach to medicine and healing. In her free time, she loves to practice yoga, run, read, and explore new, healthy recipes.

Ryan Ignatz (BA/MS 2004) studied under Dr. Bill Byrnes in the Applied Exercise Science Lab during his time in IPHY. His research provided insight into using power meter technology in cycling to quantify and predict world-level time-trial cycling performance. Over the next few years, Ryan was employed as a lecturer in IPHY, where he provided instruction for the anatomy and physiology lab courses. During this time, he was also competing at the professional level as a triathlete. Since 2006, Ryan started a professional career as a bicycle fitter in Boulder, CO at Colorado Multisport. His passion for triathlon and teaching, paired with his knowledge of the body and bikes allowed him to excel as a fitter and help athletes of all levels achieve their cycling/triathlon goals. As a fitter, Ryan understands the biomechanics of human interaction with a bicycle, assesses that interaction, and then optimizes the foot, saddle and handlebar regions for comfort and performance, while reducing the chances for injury. With his extensive experience and knowledge of bike fitting, Ryan also instructs fitters of all levels on the techniques of static and dynamic bike fitting during Retul University classes in Boulder, CO with fellow IPHY graduate Todd Carver. In his spare time, you will find Ryan being active and enjoying the outdoors in and around Boulder with his wife Maia (also an IPHY graduate).



Françoise Bentley (MS 2006) completed a MS degree in Dr. Doug Seals' lab under the guidance of Dr. Stacy Beske. With a love of teaching, she was excited to accept a position immediately in the department with the university-wide Science Education Initiative (SEI). She along with a few other alums of the department began a five-year stint working with IPHY faculty to incorporate various active learning techniques and science education research in the undergraduate courses (primarily focused on the one year Human Physiology lecture and lab sequence, Anatomy, Neurophysiology, Biomechanics and Cell Physiology). Having grown up in an academic family and only knowing the university world, upon conclusion of the grant, she sought experiences outside academia to learn other ways she could apply her physiology degree. She worked part time for a Colorado based health and wellness company and interned with the City of Boulder Senior Center and in that time learned that she could not stay away from the academic setting. She began teaching through the Continuing Education division of CU, teaching non-majors Human Physiology as well as working on a science education grant through the American Physiological (APS) and American Anatomists Associations (AAA). When not working in these positions, she can be found coaching Fairview High School's Girls Swim team, where she has coached the team for eight years. In December 2012 she and her husband Ryan welcomed their son, Miles Jacques Ferguson into the world and can't wait to take him swimming, skiing, and biking in the years to come!



After graduating with a degree in integrative physiology, **Courtney Enix** (BA 2012) began serving as a full-time State and National AmeriCorps member with the “I Have a Dream” Foundation of Boulder County. This organization works to empower children from low-income households to achieve their educational and professional goals by providing students with mentors, tutors, and various educational resources. She is serving as the organization’s Volunteer Coordinator, responsible for identifying and training community volunteers to serve as tutors during after-school programming. She also spends time each week working with these students on academic enrichment projects. In addition, Courtney is working as the Tennis Program Coordinator, coaching elementary school students twice per week. Upon completion of her AmeriCorps term of service, Courtney will continue to follow her dreams of pursuing medicine. This fall she will move to New Orleans to join the class of 2017 at Tulane University School of Medicine.

Kate Devlin (BA/MS 2002) was one of the first students to complete the concurrent BA/MS degree program in the Department of Kinesiology and Applied Physiology. During her graduate work, she evaluated the role of the stress hormone, cortisol, in the exercise-mood relationship, a project coordinated through the psychology department. She also served as a teaching assistant for neurophysiology under both Dr. Roger Enoka and Dr. John Semmler. Originally from the east, Kate had fallen in love with Boulder, CO during her years at CU and decided to search for a job locally after graduation. She began working for ChemRisk in 2003 and has been there ever since. ChemRisk is a scientific consulting firm that specializes in helping clients to characterize the health and environmental risks associated with complex chemical exposures. Kate is currently a senior health scientist with ChemRisk, and her primary experience has been in exposure assessment, human health risk assessment, and reconstruction of historical exposures. She has investigated the health effects of and characterized the risk associated with exposure to a variety of chemicals and products. Kate attributes much of her success in her current career to the strong science foundation she received through her kinesiology and applied physiology degree at CU. Outside work, Kate and her husband, Pete, are enjoying the newest addition to their family – their daughter Peyton Blue. They are very excited to introduce her to all of the wonderful things they love about life in Colorado.



Patricia C. Smith Ewen, graduated from the CU Department of Physical Education in 1959 with a BS in physical education. Over the next 32 years she taught physical education and science for five different Colorado schools: Force School, Denver (1959-1961); Orchard Mesa Junior High, Grand Junction (1961-1963); Cache La Poudre Schools (1965-1967); Craig Junior High School (1968-1978); and Pomona School, Montrose (1979-1995). After retiring in 1995, she remained active in physical education by serving as a board member for the Montrose Recreation District. Now her focus is spending time with her children and six grandchildren.

Liz Pfeffer (BA 2012) moved to Portland, ME shortly after graduating from CU Boulder with a degree in integrative physiology and a minor in Italian, and quickly found employment as a behavioral health professional providing in-home support for children with cognitive disabilities and as a yoga, barre, and pilates instructor at the Rasamaya Movement Center, a new studio in downtown Portland. She is currently undergoing training to become a personal trainer with a specialty in nutrition through the National Academy of Sports Medicine, and is working with the owner and founder of Rasamaya to develop and launch a new small-group personal training program. In the future Liz hopes to make fitness and nutrition accessible to the general population by becoming involved in public education and outreach. Her education at CU was (and is) crucial to her success in both finding jobs soon after graduation and in her job performance, and she is grateful for the opportunities it has provided.





Born and raised in Denver, Colorado, **Teresa Foley** (Concurrent BA/MS 2004, PhD 2009) moved to Boulder in 2000 to pursue her undergraduate degree in kinesiology and applied physiology. Hoping to gain more research experience, she joined the Stress Physiology Laboratory of Dr. Monika Fleshner in 2001 to explore how exercise could alter brain function and behavior. She spent the next eight years investigating the effect of physical activity on (1) stress-induced depression and anxiety-like behaviors and (2) reward pathways in a rodent model. Teresa's graduate work was funded by training grants from the National Institute of Health and the National Science Foundation, and her research is published in several peer-reviewed journals including *PLoS One* and *Neuromolecular Medicine*. In addition to her research activities, Teresa served as a graduate teaching assistant for six different courses in the Department of Integrative Physiology. She also served as a member of CU's Science Squad where she visited Denver area classrooms to lead hands-on science activities with K-12 students. During her tenure with the Science Squad, Teresa's passion for teaching evolved. After completing her doctoral degrees in physiology and neuroscience in 2009, she spent two years working for CU's Science Education Initiative. Under the guidance of Nobel Laureate Carl Wieman, she worked closely with faculty in Integrative Physiology to improve how we teach science to undergraduates. Since 2011, Teresa has been an Instructor in the Department of Integrative Physiology teaching courses in Immunology and Physiology Laboratories. She has recently been awarded the Chancellor's Award for Excellence in STEM Education (2011) and the Marinus Smith Award from the CU Parents Association (2013) for her teaching efforts. When she is not grading papers, you will find her training for a half marathon or teaching her 2-year-old nephew Conor how to ride his Strider bike.

After completing an MS degree at CU under the guidance of Dr. Seals in May of 2011, **Kate Howell** promptly began her studies in the doctoral program of physical therapy (DPT) at University of California, San Francisco in June 2011. Although Kate loved the Colorado mountains and wilderness, she was excited to move back westward to be closer to her family and the sea. Kate is an avid open water swimmer and last summer became the first person ever (along with swimming buddy Tony Lillios) to swim a round trip Crater Lake. Kate's opportunities in the IPHY program – both in the lab and in the classroom – have been valuable to her budding career as a DPT student. She was involved in teaching the UCSF and Stanford Medical students anatomy and tests of the musculoskeletal systems. Kate is also working with the Brain and Spinal Injury Center (BASIC) at San Francisco General Hospital and hopes to help translate findings in the rodent model into clinical practice for patients. Kate is in her second year of PT school and excited that the didactic first year has transitioned to more clinical and research-based education as she is looking forward to the hands-on work with patients. PT school is challenging and hard work but Kate is very happy to be doing it and grateful for the opportunities she was given at all the educational institutions she attended to get her where she is today – CU (MS 2011), UC Davis (BS 2008), and SRJC (2005).



Paul McCauley (BA 2012) moved back to Seward, Alaska after graduation to help his parents build a house. He has been volunteering at the Alaska Native Medical Center Physical Therapy Department, the Providence Seward Mountain Haven Physical Therapy Department, Prestige Care Inc. long-term care facility, and working with an elderly neighbor who has an advanced stage of Alzheimer's. To combat the financial strain of free work, he has recently working part time work as a longshoreman, offloading cargo ships and as summer comes, cruise ships that arrive at the port of Seward two or three times per week. The year has been full of new and interesting experiences for him, which he hopes will strengthen his resume when he will applies to PT school this coming summer. In the meantime, he continues to live life as fully possible; he wrote this update on the deck of a ferry from Newcastle, UK to Amsterdam while eating corned beef from a can and enjoying a cold two-liter bottle of instant coffee. Upon returning to the states in May, Paul is looking forward to continuing his journey toward acceptance into a physical therapy school, as well as spring skiing in Alaska and the upcoming whitewater season.

Matthew Beale (BA 2011) graduated with no idea of where to apply his knowledge, skills, and energy. While an IPHY student, he assisted with research in Dr. Rodger Kram's Locomotion Laboratory and developed a deep interest in meshing mechanical concepts with the whole human body rather than microscopic processes. After graduation, Matt realized that his interests align very well with the field of prosthetics and orthotics, which focuses on helping people who have either lost a limb or experienced a reduction in the function of a limb. He moved to Seattle, WA and volunteered in prosthetics and orthotics clinics to gain experience in the field. Currently, he works at the Center of Excellence for Limb Loss Prevention and Prosthetic Engineering in the Department of Veterans Affairs located in Seattle, WA where he assists with research projects on amputees. In Fall 2013 he will begin the MS program in prosthetics and orthotics at Georgia Institute of Technology. His goal is to practice as a certified prosthetist/orthotist in order to restore limb function to those individuals who have lost it.



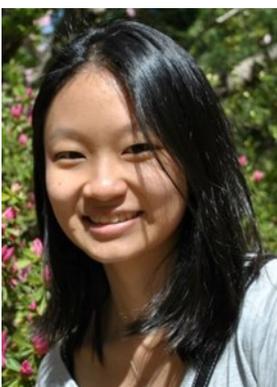


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Prior to earning a masters degree, **Nicole M. Protzman (Gordon)** (MS 2011) completed a BS degree in exercise physiology at the University of Massachusetts Lowell (2009). Shortly after graduating with the BS, she moved across the country to study under the guidance of Dr. Roger Enoka in the Neurophysiology of Movement Laboratory. Nicole investigated the influence of handedness and dominance on endurance time and the accompanying neuromuscular adjustments that occur when subjects sustain submaximal isometric contractions, requiring either force or position control. In her free time, Nicole explored the unique characteristics of Boulder: hiking the flatirons, running trails, and discovering a taste for beer. It was here she met her husband, Brent. Her time at UCB passed quickly, and after graduation, Nicole and Brent made a 30-hour cross-country trek to the beautiful Lehigh Valley, PA. Presently, Nicole works at Coordinated Health as a research associate. Although the health network began as an orthopedic surgery practice, it has expanded to include a variety of specialties. Consequently, Nicole's research encompasses many disciplines, such as foot & ankle reconstruction, orthopedics, physical medicine & rehabilitation, and primary care sports medicine. Her ongoing projects aim to evaluate the efficacy of novel treatment modalities using short- and long-term clinical outcome measures. Nicole has continued her passion for running, traveling, and reading. In the past year, she and Brent have traveled to Cape Cod, the Mediterranean, Rome, Hawaii, and most recently, Huntington Beach and San Diego. Although she misses the flatirons, she loves the close proximity to her family.

After graduating from the CU Integrative Physiology program, **Samuel Pare** (BA 2012) moved back to his hometown of East Grand Rapids, MI. His career goal is to attend dental school so has been engaging in activities that will strengthen his application and provide him with relevant experience for a dental program. This includes observing and assisting in a local dental office, and enrolling in science classes at a nearby university to obtain the few credits he still require. He is participating in CU's Committee Letter program for the 2014 dental school application cycle and looking forward to returning to Boulder in April for an interview. He has also applied for a yearlong MS program in physiology at the University of Michigan. His sister is currently attending business school at U of M and he hopes to join her there this fall. He has spent time catching up with old friends and going to concerts, and is looking forward to spending much of the summer on Lake Michigan. He had begun training for his first marathon in January, but tore an ACL playing basketball and is currently performing physical therapy and hoping to be able to run the Chicago Marathon in October.



Rena Zuo (BA 2009) graduated with a major in integrative physiology and a minor in Chinese. After graduation, she took two years off to take the MCAT and apply to medical school, but also to enjoy some time pursuing other interests. She traveled to Australia to participate in the Inter-Continental Advanced Materials for Photonics Summer School to learn about the usage of light in bioscience research. She also traveled to China to participate in an internship at Tongji Hospital shadowing anesthesiologists and surgeons. In addition, she played piano and violin in a local band and performed at a couple bars and coffee shops. In August 2011, she officially began the road to medicine at Duke University School of Medicine. She is now finishing the second year, which will conclude with clinical rotations. Her goal is to integrate her love for public health and research, specifically in the context of preventive medicine and elderly care. Next year, she will join the National Institutes of Health in Washington DC for a one-year clinical research project with their Medical Research Scholars Program. Although she misses Colorado's blue sky and mountains, she has begun to love the beaches and greenness that the east coast offers.

After studying sports medicine at the University of Wisconsin, **Sarah Kennedy** (MS 1998, PhD 2005) arrived in Boulder in August 1997. Sarah was able to keep a foot in the clinical realm, working in a physical rehabilitation center, while beginning a MS degree. She studied the effects of altitude on fat metabolism under Dr. Robert Mazzeo, while also spending a lot of quality time measuring catecholamines on the trusty HPLC. This skill helped find her a place in Dr. Moni Fleshner's Psychoneuroimmunology Laboratory, where she examined the effect of splenic norepinephrine on stress-induced immunosuppression. Sarah split time over the next few years between bench science and the science education initiative, and this combination of skills has proven to be quite valuable in her current role as an educator for a pharmaceutical company. Outside work, Sarah can be found chasing her 3 boys (husband and 2 sons) down ski slopes in the winter and up mountain bike trails in the summer.



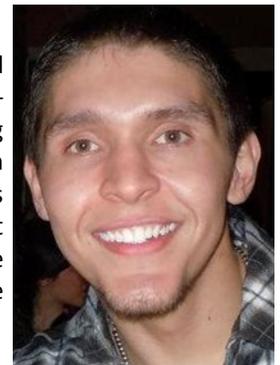


Gavin Dawson (BA 2012) graduated with a double major in integrative physiology and psychology and neuroscience and a minor in philosophy. After graduation he found the perfect job allowing him to combine his passions for medicine, travel, and the outdoors. This job took him all the way to Thailand where he helps lead several medical service projects. These programs provide U.S. and international high school teens and gap-year students the opportunity to travel to Thailand where they can obtain either their Wilderness First Aid or Wilderness First Responder certifications, in addition to assisting local Thai doctors and nurses with their treatments. After the summer Gavin spent several months travelling around India, and followed that up with three months in Colombia, Ecuador, and Peru. He finally returned to Colorado where he began working for Wilderness Medical Associates International, teaching wilderness medical courses, alongside fellow EMTs, to students around the country. This summer he will be going back to Thailand to work on the same program, and has high hopes of expanding its reach into Burma and India. When Gavin is not on the road teaching or travelling abroad you can find him backcountry skiing, climbing, hiking, camping, and enjoying everything else Boulder has to offer. He is immensely grateful for the opportunities his IPHY education has offered him and plans to continue teaching wilderness medicine for several years before beginning the medical school application process.



Jennie Sims (BA 2012) began an internship with the SENS Foundation in Mountain View, California soon after graduation. The internship involved research on both cancer and stem cell projects. In parallel, she developed a proposal to investigate the function of microglia in Alzheimer's disease, for which she was awarded a \$2,500 grant. Upon completion of her summer projects, she accepted a position as a research assistant at Syracuse University in New York. She is now currently working on epigenetic mechanisms of gene regulation in response to early life stress using the *C. Elegans* model system under the guidance of Dr. Sarah Hall. She plans to apply for admission to graduate programs in the molecular biology, physiology, and neuroscience next year.

David Lucero (BA 2010) began working as a personal trainer. He used his knowledge in physiology and biomechanics to develop in-depth fitness regimens for his clients. After working for about a year, he began the process of applying to medical school. He used the ACCESS program at CU to take the remaining organic chemistry prerequisites along with genetics. He worked at a gym and trained private clients on the side while preparing for the MCAT and while working through the committee letter process. He was accepted to the University of Illinois Medical School and will begin fall 2013. He hopes that his time spent in the McNair program doing research will help him conduct research while attending medical school. He is currently preparing for the trip to Chicago while working and trying to enjoy his last summer before medical school.



Molly Russell (BA/MS 2009) began working in Dr. Seals' Integrative Physiology of Aging Lab in 2006 as a sophomore. During that time, she helped with various projects, including processing human endothelial cells and isolation of mononuclear cells. In 2007, Molly joined the BA/MS concurrent degree program and began working with the B6D2F1 mouse model in vivo experiments on the effects of western diet vascular endothelial function. After graduating in 2009, Molly has continued to work in Dr. Seals' lab as a professional research assistant, coordinating human studies at the Clinical Translational Research Center. Her current project involves testing the use of a disaccharide sugar called trehalose to improve vascular endothelial function in older individuals. Molly was recently accepted into the Colorado School of Public Health, and will be taking courses for a master of public health degree in the fall of 2013. After getting married last summer, Molly and her husband have found more time for running, soccer, biking and other Colorado adventures. In addition, they have enjoyed visiting family and friends in their hometown of Hot Springs, South Dakota.



Kudos to Faculty, Staff, and Students

On average, each tenured or tenure-track member of our faculty (assistant professors, associate professors, and professors) are expected to spend 40% of their time conducting research. The following list represents some of the key research findings of our faculty during the 2012-13 academic year:

- Animals that are genetically altered to increase lifespan up to ten fold show a similar increase in the duration of a healthy life ("healthspan"). [**Tom Johnson**]
- Insufficient sleep during school or work increases total daily energy expenditure and results in people eating more. [**Ken Wright**]
- Running barefoot offers no metabolic advantage over running in lightweight, cushioned shoes. [**Rodger Kram**]
- A number of chronic anxiety-like states in rodents are associated with changes in a gene that controls the synthesis of the neurotransmitter serotonin. [**Chris Lowry**]
- External cues are more important than internal one when learning a novel task. [**Dave Sherwood**]
- Access to a running wheel decreases the amount of alcohol that mice choose to drink. [**Marissa Ehringer**]
- Neuromuscular function during a fatiguing contraction differs for left- and right-handed individuals. [**Roger Enoka**]
- The effect of nicotine on physiology and behavior differ during the day and can be modulated by melatonin. [**Jerry Stitzel**]
- Regular brisk walking prevents damage to arteries associated with aging and early diabetes. [**Doug Seals**]
- The reproductive brain, similar to the cognitive brain, is highly plastic and its aging can be rescued by interactions with the opposite sex. [**Pei-San Tsai**]
- Patterns of alcohol abuse by adolescents can predict those likely to engage in risky sexual behavior. [**Matt McQueen**]
- Adequate sleep is a lifestyle choice that can be modulated and contribute to weight loss. [**Ken Wright**]
- A small molecule called microRNA regulates the gene associated with the risk for nicotine dependence. [**Marissa Ehringer**]
- The metabolic cost of a novel reaching action declines with practice. [**Alaa Ahmed**]
- Mutations in one group of genes can result in reproductive anomalies, such as absent puberty and infertility. [**Pei-San Tsai**]
- Sex differences in the prevalence of knee osteoarthritis cannot be explained by differences in biomechanics, sex hormones, or pain. [**Roger Enoka**]
- Individuals with an elevated genetic risk for nicotine dependence are more likely to become heavy smokers if they begin smoking in adolescence. [**Jerry Stitzel**]
- Older adults rely more on hip muscles than young adults when walking uphill and downhill. [**Rodger Kram**]
- Reducing salt intake by one half restores vascular function in older men and women. [**Doug Seals**]

The department is fortunate to have six extremely capable administrative staff members who manage the day-to-day operations of the department. **Jennifer Law**, who is one of these staff members, was promoted to the position of Operations Manager for the department during the last academic year. Jennifer was hired at CU Boulder in 1994 and has achieved significant professional growth over the last 19 years, including completing an MBA in 2000. During her time on our staff, Jennifer has been involved in the genesis of IPHY (2003) and the subsequent exponential growth in the popularity of our major. Her duties include supervising four staff who manage payroll/travel, purchasing/property, animal care, and information technology. She also provides the faculty with personnel assistance and the management of research grants.





At our graduation ceremony on May 10, 2013, three of our graduate students were recognized for completing the requirements for a doctorate in integrative physiology. These graduates, Todd Darlington, Jamie Justice, and Will Horton, came from diverse backgrounds and had a range of experiences during their 4-5 years of doctoral training in our department.

Todd Darlington (PhD 2013) grew up in Stillwater, Oklahoma and received a BA in Biology from DePauw University in Greencastle, Indiana. After graduation, he worked as a research assistant at the Indiana University School of Medicine where he studied the role of genetics on acute alcohol behaviors. Four years of research convinced him to pursue a doctorate in the Genetics of Substance Abuse Laboratory at CU, led by Dr. Marissa Ehringer. Todd's work focused on measures of transcription to identify both genetic determinants of alcohol behavior as well as genetic mechanisms for reducing alcohol consumption through exercise. In his spare time, Todd can be found running, hiking, or cycling on the roads and trails around Boulder. He has enjoyed his time at CU, and is looking forward to starting a postdoctoral fellowship at the University of Utah School of Medicine. In addition, Todd and Ashley Walker (IPHY, PhD 2010) will be getting married this summer!



Jamie Justice (BA 2007, MS 2009, PhD 2013) grew up between Texas and beautiful, rural Virginia. She attended the American Institute of Massage therapy in Virginia (1999) and worked extensively with endurance athletes and teams in the region, while also competing in snowboarding and ultra-distance trail running events. After meeting her now husband, Mike Pont and step-son Jasper, Jamie moved to Boulder where she earned an advanced certificate in Sports and Orthopedic Massage from Boulder College of Massage Therapy and started her own business (2003) before enrolling in the Department of Integrative Physiology at the University of Colorado Boulder (fall 2004). As an undergraduate, Jamie was given an opportunity to work in Dr. Roger Enoka's Neurophysiology of Movement Lab (2006) and discovered she loved research. Jamie subsequently joined the Enoka lab as a graduate student and worked on projects investigating muscle activation strategies during fatiguing contractions. She was supported by the Phi Beta Kappa Crisp Fellowship and graduate scholarship, teaching and research assistantships. After completing an MS (2007), she changed her focus to investigate age-related declines in motor function. Jamie's doctoral work included a unique translational perspective of age-related movement impairments, which was funded by an NIH aging and training grant. Three months into her PhD program, Jamie and Mike welcomed a new baby boy, Tobe Justice Pont (Aug 2009). In addition to successfully defending her PhD in spring 2013, in the last year Jamie and Mike successfully juggled Mike's custom carpentry business, taught their teenager to drive, toddler to use the potty, Rottweiler puppy to use the dog door, and all while engaging in endurance trail running, rock climbing, snow sports, craft-beer drinking, and general Colorado life. Now Jamie will continue research at the University of Colorado as a postdoctoral fellow in the Seals' Integrative Physiology of Aging Laboratory, investigating the influence of dietary and lifestyle interventions on functional decline in translational human and animal models of aging.

Will Horton (PhD 2013) received a BS from Michigan State, where he performed undergraduate research on the behavioral genetics of aging before moving to Colorado. He worked as a laboratory technician before moving on to complete his PhD under the mentorship of Dr. Jerry Stitzel. For his thesis project, he worked on the interaction between the circadian system and drug abuse. Specifically, he examined the effect of melatonin on the activity of nicotinic acetylcholine receptors and the response to nicotine. Understanding how these systems interact could lead to development of a novel therapy for smoking cessation. In addition to his research activities during his time in the Molecular Neurogenetics Laboratory, Will mentored a number of undergraduate and high school students, attended conferences in places such as Rome, Italy and secured his own funding with a Beverly Sears grant from the university. After completing his PhD this summer, Will is going to start a post-doctoral fellowship position at Pennsylvania State University with Dr. Timothy Jegla studying the role of voltage-gated potassium channels on neuronal activity and behavior. Will, his wife Helen, son Henry, and golden retriever Chyo are looking forward to hiking and biking in Happy Valley, and being able to watch Big Ten football in person again.

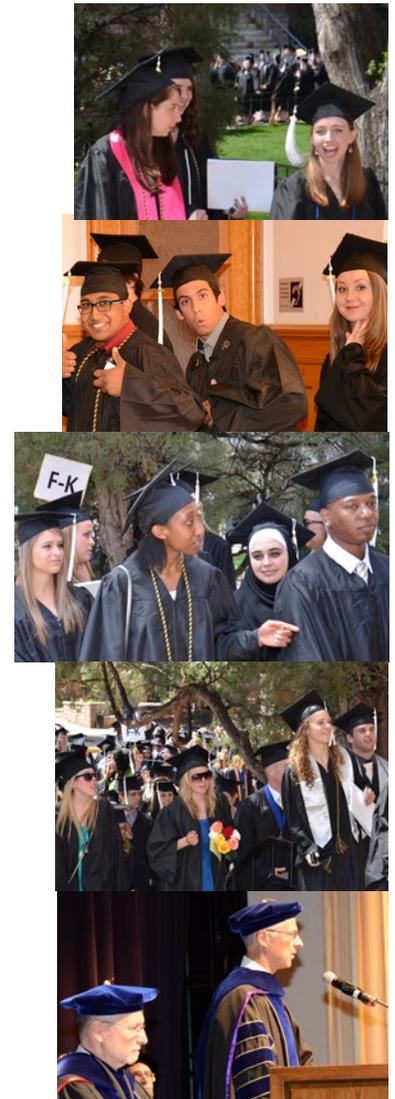




May 2013 Bachelor of Arts

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