Integrative Physiology
University of Colorado Boulder

Department Newsletter

IPHY

Issue #18 Fall 2021

Special points of interest:

- $3M Endowment to IPHY department/students
- CU Boulder students (700) first to participate in Moderna vaccine study; eventually rolled out to 12,000 college students at 21 universities
- Diet, nutrition and exercise are among the most accessible and effective interventions to reduce depression in young people

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A Few Words from Interim Chair Marissa Ehringer

The past couple of years have been quite a rollercoaster for everyone, given the challenges associated with the COVID-19 pandemic. I am grateful for former Chair Mark Opp's dedication to the department during that difficult period, as I only became interim chair in August 2021. Our faculty, staff, and students had to rapidly transition to remote teaching and learning during the spring 2020 semester, with a majority of our courses offered remotely during the 20-21 academic year. Former Associate Chair of Undergraduate Affairs Ruth Heisler spent countless hours organizing course schedules, alongside keeping faculty updated regarding COVID teaching policies and strategies to facilitate the best student learning experience possible. The 21-22 academic year was closer to normal with most of our courses having an in-person modality, except for a two-week period of remote teaching to start spring 2022 due to the Marshall fire that devastated our community, along with the spread of the COVID omicron variant. It is helpful to recognize some positive outcomes from the pandemic that will enhance our educational mission in the future, and they include: 1) an increase in online resources for student learning; 2) an increase in IT capabilities in classrooms for recording lectures and teaching in hybrid modes; and 3) a recognition of the value in flexible learning options.

In other exciting news, we are pleased to announce that construction of a new 22,895 square footage building to house 4 IPHY faculty research labs and 17 offices was completed in May 2020 with occupancy in September 2020. This addition to the Ramaley building has provided state-of-the-art laboratory space for faculty previously located in Carlson. It is also the new home of the Clinical Translational Research Center, managed by Dr. Chris DeSouza.
(Below: 2017 New Ramaley Rendering; 2022 New Ramaley Photo)

We are looking forward to serving future undergraduates, graduate students, and other researchers as our department continues to grow and evolve with changes in teaching pedagogy, technology, and scientific advancement.

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John & Ann Harsh Endowed Scholarship/Bequest to Department/Students

As the first in their families to go to college, John and Ann Harsh understand some of the challenges first-generation students face. Now, they are paying it forward by creating a scholarship for first-generation and underrepresented students studying integrative physiology at CU Boulder, as well as a bequest to establish the first endowed faculty chair in the Department of Integrative Physiology and directorship of the Health Professions Residential Academic Program (HPRAP).

John Harsh, a board-certified clinician in sleep medicine, has been a pioneering researcher whose investigations of treatments for narcolepsy with cataplexy contributed to the development of a potentially transformative new therapeutic approach now undergoing clinical trials. Currently, he is an Integrative Physiology Professor Adjunct at CU Boulder. Ann Harsh is a lifelong educator who has also collaborated in his research for decades.

The John and Ann Harsh Endowed Undergraduate Scholarship Fund will yield $4,000 in scholarships annually for first-generation or underrepresented students majoring in integrative physiology with the current estimated value of $3 million.

The Harshes recognize the transition to university life is full of challenges for first-generation and educationally disadvantaged college students. What they need is not just financial support, but social support as well. With their endowed scholarship and bequest, John and Ann are aiming to make CU Boulder's Integrative Physiology program the best undergraduate program of its type. Ann and John summed it up: "That would be our legacy."
https://www.colorado.edu/today/2021/09/13/veteran-scientist-educator-pay-it-forward-future-generations-health-science-students

Diet and Exercise Can Improve Teens' Mental Health

Depression and anxiety have been increasing among teenagers worldwide for many years, and the COVID-19 global pandemic only exacerbated the problem. In October 2019, the William Templeton Foundation for Young People's Mental Health launched a wide-ranging, international, multi-disciplinary project intended to "innovate early interventions for depression in young people." The project brought together stakeholders and specialists from students to educators, physicians, nutritionists, researchers and even insurance-company representatives to focus on key aspects of the causal pathways of depression in young people. Among those invited to participate was Associate Professor Christopher Lowry of Integrative Physiology at the University of Colorado Boulder.

After collating ideas and information from a series of online workshops from November 2019 to January 2020, the project issued its 120-page final report, "Changing Hearts, Changing Minds". One key finding is that diet, nutrition and exercise are among the most accessible and effective interventions to reduce depression in young people. "That may sound simple", Lowry says, "but those interventions are also potentially the hardest to implement because they involve lifestyle changes."

He and other researchers have built a body of evidence confirming that they also have a profound impact on mental health, through mechanisms as varied as the "gut-brain axis," epigenetics, the impact of hormones on stress, and sleep. "As scientists, one of the criticisms we often hear is that we work in silos—a narrow focus, without really interacting with other scientists," he says. "But this particular project was good at breaking down those silos. It's rare to be able to engage with a process that has such a broad spectrum of participants."
https://www.colorado.edu/asmagazine/2021/11/02/diet-and-exercise-can-improve-teens-mental-health

Christopher DeSouza Receives College Professor of Distinction Title

IPHY Professor Chris DeSouza was one of four University of Colorado Boulder faculty recently named Professor of Distinction in the College of Arts and Sciences. The "professor of distinction" title is for scholars and artists of national and international acclaim whom peers also recognize as exceptionally talented teachers and colleagues.

He has directed the Integrative Vascular Biology Laboratory at CU Boulder since 1999, and his research focuses on the effects of cardiovascular and metabolic risk factors, HIV-1 infection and, most recently, spinal cord injury on vascular endothelial cell function. Additionally, he has been director of the University of Colorado Boulder Clinical and Translational Research Center (CTRC) since 2008. The CTRC provides clinical infrastructure, resources, and dedicated space for investigators on the CU Boulder campus to conduct human biomedical research.

Recently, Dr. DeSouza was a principal investigator for the CU Boulder clinical sight of the PreventCOVIDU Trial. This federally funded, national study focused on the Moderna vaccine preventing COVID-19 infection and transmission in college students. CU Boulder students were the first to participate in the clinical trial that ultimately involved more than 40 colleges and universities across the country. The trial enabled researchers to capture infections in real time and track the viral load, or the amount of viral particles present in an infected individual, over the course of an infection.

Professor of Distinction Chris DeSouza (left); Olivia Parsons (right), 22, a neuroscience major at CU Boulder, gets her first dose of the Moderna vaccine.

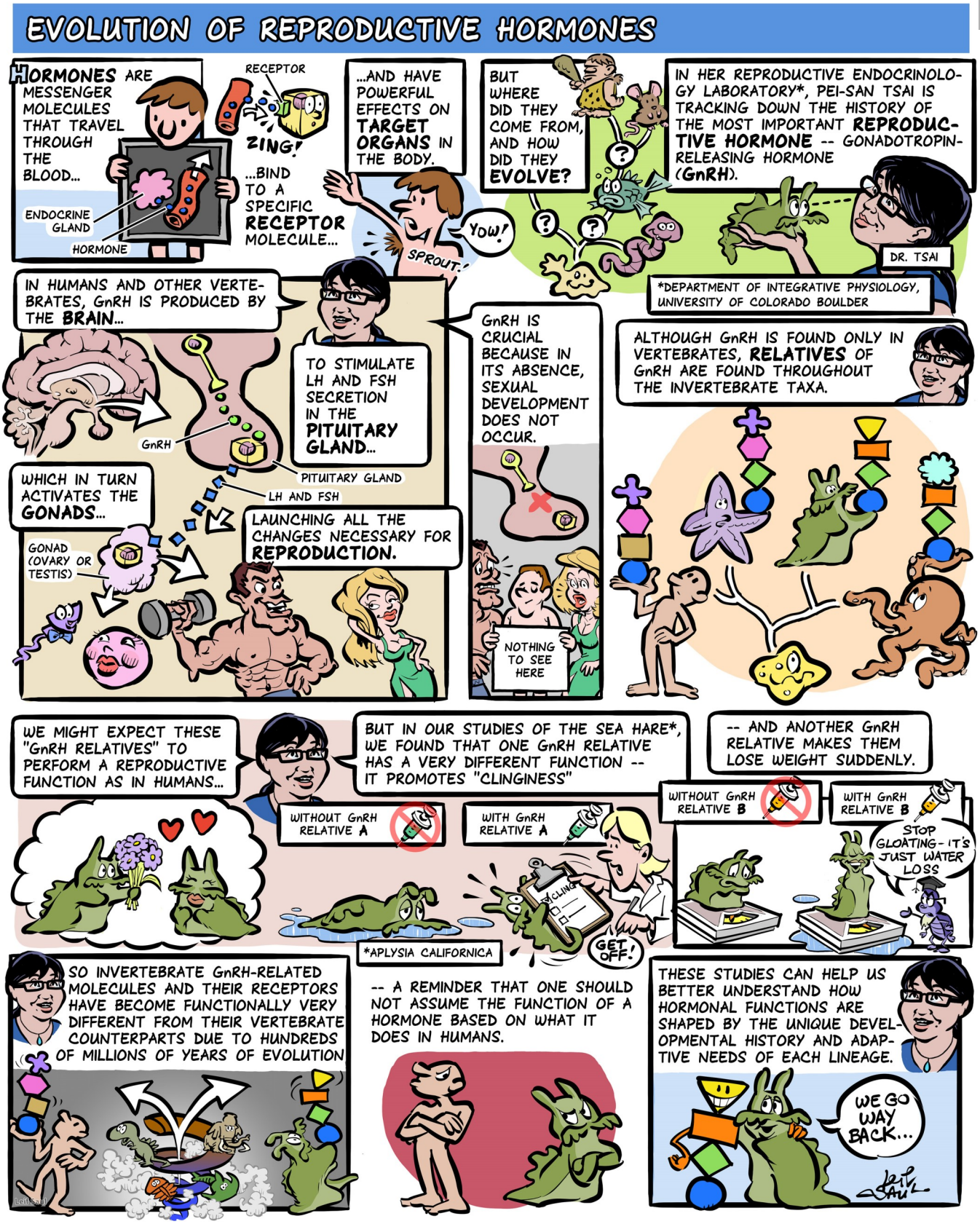
We Welcome Our New Faculty

Tanya Alderete, PhD
University of Southern California, Assistant Professor
Dr. Alderete fuses clinical research with epidemiological approaches to evaluate the contribution of environmental exposures to the development of disease. Her research includes some of the first investigations to show that exposure to near-roadway and ambient air pollution contributes to the pathophysiology of type 2 diabetes in youth. Dr. Alderete's laboratory is currently investigating the influence of environmental exposures on the composition and function of the human gut microbiome. She teaches Introduction to Data Science and Biostatistics for the department.

Andrew Tan, PhD
Northwestern University, Assistant Professor
Dr. Tan has training in biomedical engineering and neurophysiology. His lab investigates the biomechanical constraints and the neurophysiological mechanisms underlying sensorimotor recovery following spinal cord injury. His current research focus is developing innovative paradigms that induce adaptive reorganization in the nervous system, leading to gains in motor function and improved quality of life in people with paralyses. He teaches undergraduate Biomechanics and graduate Neuromechanics for the department.

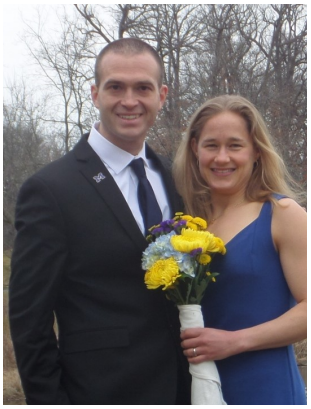
Maureen Floriano, PhD, MPH
Case Western Reserve University, Assistant Teaching Professor
Dr. Floriano received her doctorate in medical anthropology and master of public health from Case Western Reserve University. Her doctoral research involved understanding how patients of an overdose education and naloxone distribution (OEND) clinic conceptualized their substance use disorder (SUD). Prior to her appointment at CU, Dr. Floriano worked for over five years in Harm Reduction Public Health Programming in the Office of Opioid Safety at MetroHealth Hospital in Cleveland, Ohio. Dr. Floriano is responsible for teaching Epidemiology and Global Health along with a Foundations in Public Health course. In addition, she helps advise students interested in the Undergraduate Certificate in Public Health.

Cartoon Representation of Dr. Pei-San Tsai's Research by Leif Saul



Alumni Updates

Rachel Gioscia-Ryan (BA 2011; MS 2011; PhD 2016) and **Ben Ryan** (BA 2009; PhD 2016) earned a combined total of five degrees in Integrative Physiology at the University of Colorado Boulder, culminating in the receipt of PhDs together on their 6-year wedding anniversary. As an undergraduate, Rachel enrolled in the BA/MS program, completing her MS thesis in Dr. Russ Moore's Cardiac Physiology Laboratory. She then joined Dr. Doug Seals' Integrative Physiology of Aging Laboratory, where her doctoral dissertation studies investigated mitochondrial oxidative stress and antioxidant therapy in arterial aging. Ben received his BA *magna cum laude*, completing his honors thesis under the supervision of Dr. Bill Byrnes. He then continued in Dr. Byrnes' Applied Exercise Science Laboratory, where his dissertation research examined rapid alterations in hemoglobin mass with high altitude acclimatization/de-acclimatization and following simulated microgravity.



After 10 (Ben) and 11 (Rachel) years at CU Boulder, they moved to the University of Michigan where Rachel earned her MD with Distinction in Research honors and Ben completed a postdoctoral research fellowship in kinesiology. Rachel is currently a resident physician in anesthesiology at the University of Michigan, and plans to pursue clinical and research fellowships with the ultimate goal of working as a physician-scientist. After completing his postdoctoral training, Ben took a position as a research physiologist in the Thermal and Mountain Medicine Division at the US Army Research Institute of Environmental Medicine. Rachel and Ben are continuing to pursue exciting research questions in integrative physiology and are thankful for the exceptional training, mentorship, and opportunities they received in IPHY at CU Boulder.

Ryan Alcantara (MS 2019; PhD 2021) is currently a member of the Wu Tsai Human Performance Alliance at Stanford University, a new research initiative focused on studying athletes and translating biomechanical and physiological findings to improve human health. Most of his PhD research at CU Boulder was the result of a multi-institutional collaboration funded by the PAC-12 Student-Athlete Health and Wellbeing Initiative, so he was excited to join another collaborative effort focused on human performance. As one of nine postdoctoral research fellows with different areas of expertise in human physiology, biomechanics, engineering, medical imaging, computer vision, and machine learning, he will be expected to define his own line of research. It has been exciting to see what research questions exist at the intersection of the different areas of expertise!

In many ways, the year after graduation felt much like the year before graduation—still working from home most days and still finding masks in the pockets of jackets. But that's not to say things haven't changed. The addition of a puppy means that he also finds compostable bags and old dog treats in his pockets! Also, his new fellowship position meant a move to California this summer with Maggie and Beau. They may have traded the Rocky Mountains for the Pacific Ocean, but they are still finding opportunities to enjoy the snow they grew accustomed to in Colorado (picture: skiing in Tahoe!).

Internships by Jia Shi

The Integrative Physiology (IPHY) department has an active program to bring students internships in their areas of interest. These internships offer students the opportunity to "test drive" their career choices, gain experience in fields of interest to them, and allow them to give back and support our local community. Internships are available for academic credits, regardless of if they are paid or unpaid. We have a diverse portfolio of 160 internship opportunities – from dental offices to emergency rooms, from sports medicine to physician's offices, and everything in between. This includes internship opportunities with CU Sports Medicine, Boulder Medical Center, and Children's Hospital. We also work with University Career Services to offer students 8-week long summer internships abroad.

Though the program has been in existence since before 2004, we have made a number of improvements in recent years, both in finding new and more diverse student opportunities and in streamlining the application and execution processes. Nine other campus departments (Psychology, Theatre and Dance, Sociology, Engineering and Applied Sciences, Geology, International Affairs, Environmental Design, English, and Centers of the American West), Career Services, and the University of Colorado Denver have adapted our internship program improvements.

Starting in May 2020, we began offering internship credits for paid internships, which opened up opportunities for our students in need population. Through collaborations with the "Extraordinary Program" in Continuing Education, we also can offer significantly reduced summer fees for internship credits for these students.

We also created an annual internship fair to provide students with more information. At our last fair, 200+ students attended with 15 organizations offering internships (see photo below). While an internship is not required for the IPHY major, the benefits of doing an internship in relation to career aspirations is significant. We have received great feedback from students who participate and hope this article has motivated other IPHY students to consider an exciting IPHY internship opportunity—you will find more information here on our website!

Kudos/News

Dr. Tanya Alderete has recently published two papers, the first in *Gut Microbes* that described the associations between infant gut microbial diversity and rapid growth in the first year of life and the second in *Nutrients* that identified inadequate intake of important micronutrients in lactating mothers.

Maximilian Bailey, a MS student in **Dr. Tanya Alderete**'s lab, presented a poster on preliminary data examining the association between ambient air pollutant exposure and the infant gut microbiota at the 2021 International Society for Environmental Epidemiology conference. He also was recently accepted into three medical schools.

Dr. Jordan Buck, a former PhD student in **Dr. Stitzel**'s lab, had some of his PhD work on the effect of *in utero* nicotine exposure on epigenetic alterations in the brain highlighted by the National Institute for Drug Abuse in their NIDA Notes.

Dr. William Byrnes retired from his distinguished research and teaching career in exercise physiology fall 2020.

Dr. Janet Casagrand presented two talks at the 2021 Colorado Learning and Teaching with Technology (COLTT) . One was on adapting a hands-on, group-based lab course to an online format and one on creating a manipulatable activity for small group, online breakout discussion.

Drs. Janet Casagrand and **Nicole Stob** were selected to participate in the Online Teaching Academy for Summer 2022.

Kevin Clark, a graduate student in **Dr. Tanya Alderete**'s lab, received a $1000 Beverly Sears award.

Dr. Zachary Clayton, a senior postdoctoral fellow in **Dr. Douglas Seals**' laboratory, published two complementary manuscripts characterizing the mechanisms by which the common chemotherapeutic agent doxorubicin causes vascular dysfunction.

Dr. Teresa Foley is the first "Principal Instructor" in the department, and she is the new Associate Chair for Undergraduate Affairs.

Dr. Todd Gleeson, former Dean of the College of Arts and Sciences, retired fall 2021. Having led the efforts to establish the Buffalo Bicycle Classic scholarship fundraiser and the Health Professions Residential Academic Program (HRAP), his efforts toward increasing accessibility and participation in higher education for many students will have long-lasting effects.

Dr. Alena Grabowski recently received two grants from the Department of Veterans Affairs Rehabilitation, Research, and Development Service, a Small Projects in Rehabilitation Research Award titled "Use of Wearable Sensors to Assess Prosthetic Alignment in Veterans with Unilateral Transtibial Amputations" and a Merit Review Award titled "Improving Socket Fit in Female and Male Veterans with Transtibial and Transfemoral Amputation".

Dr. Charles Hoeffer had a paper, "RCAN1 knockout and overexpression recapitulate an ensemble of rest-activity and circadian disruptions characteristic of Down syndrome, Alzheimer's disease, and normative aging", accepted in the Journal *of Neurodevelopment Disorder*. He also received the AB Nexus Research Collaboration Grant given to those with innovative research projects that aim to improve human wellbeing through basic science and translational research approaches.

Dr. Monique LeBourgeois received the College Scholar Award which allows her to request a semester free from classroom teaching within the next four semesters to pursue research questions**.**

Dr. Robert Mazzeo, longtime Associate Chair for Graduate Affairs, retired fall 2020 having made significant contributions to our teaching mission and serving as a research advisor for many graduate students.

Dr. Mark Opp is the new Director of the Health Professions Residential Academic Program.

Drs. Mark Opp and **Rachel Rowe** received a funding recommendation from the Department of Defense for a Partnering PI award titled "The Role of Microglia in Sleep Disturbances Following a Traumatic Brain Injury". The award is part of the U.S. Army Medical Research and Development Command, Congressionally Directed Medical Research Programs Peer Reviewed Medical Research Program. This 5-year project has a requested budget of $3,092,998 total costs**.**

William Patterson, a doctoral student in **Dr. Alderete**'s lab, presented a lightning talk on preliminary data examining air pollution, circulating microRNAs, and cardiometabolic risk factors at the 2021 International Society for Environmental Epidemiology conference. He also submitted an NIH F31 fellowship application and co-authored two publications.

Dr. Rachel Rowe is a co-author on a publication in the *Journal of Neurotrauma* that investigated how traumatic brain injury in pregnant mice contributes to neuronal, behavioral, and immunological deficits in offspring. Her lab also published two papers in *Frontiers in Neurology* that investigate how age-at-injury affects the neuronal and glial response to diffuse traumatic brain injury in juvenile and adult rats. Additionally, she was session chair and speaker at the International Brain Injury Association 2021 World Congress, a speaker at the National Neurotrauma Symposium, and received the National Neurotrauma Society Family Care Grant.

Dr. Jerry Stitzel published four articles on: 1) genetic influences on nicotine consumption, published in *Frontiers in Psychiatry*, 2) specific genetic variant impacts the disordered behavioral outcomes following in utero nicotine exposure, published in *Behavioral Genetics*, and 3) epigenetic consequences of in utero nicotine exposure, published in *Biology of Reproduction*. He also was co-author on a paper that demonstrated the role of a specific genetic variant in COPD-like lesions, published in *Nature Communications*.

Fall 2021 Bachelor of Arts

Gwendolyn Anderson-Harty
Amel Attalla
Courtney Binkley
Ethan Brouillette
Natalie Brown
Ashley Burns
Grant Claymon
Brooke Cline
Nick Countryman
Kaylee Cowles
Karley Deegan
Taylor deProsse
Sabrina Dierickx-Gamboa
Aaron Dorman
Elizabeth Dupuis-Spiva
Taylor Dutton
Isobel Frankel
Payton Gardella
Emily Greenspan
Sarah Grout
Grace Gunlikson
Sean Hall
Jaina Houston
Emily Jacobs
Joslynn Jones
Logan Kittler
Rebecca Korn
Miles Levin
Erikah Mach
Meredith Malone
Hannah Maschner
Jordyn Milbrath
Riley Morgenthaler
Faith Pacheco
Gabrielle Patterson
Connor Salmen
Lauren Sandal
Wandy Santos Morales
Hunter Sherraden
Abigail Smith
Mallory Spring
Alexandra Strauss
Stephen Swindell
Rebecca Teeter
Maria Uberna
Daniel Umbreit
Megan Winter
Robert Yuan

Fall 2021 Master of Science

Jackson Brill
Mentor: Rodger Kram
Thesis Title: Walking and Running on Uphill Slopes: Gait Transitions and Metabolic Economy

Many Thanks to Donors!!

As usual, we thank our alumni and supporters. Your comments, suggestions, and financial support have contributed greatly to the success of our department.

Greg Adamietz
Monica Adamietz
William Byrnes
Janet Casagrand
Dexanne Clohan
William Clohan
Bradley Davis
Lynn Davis
Marissa Ehringer
Bonny Enoka
Roger Enoka
Donald Evans
Christina Feeny
Curtis Feeny
Joel Feldman
Cynthia Fernandez
Teresa Foley
Joellen Fresia
Cody Gillenwater
Carol Gleeson
Todd Gleeson
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John Harsh
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Fritzi Henning
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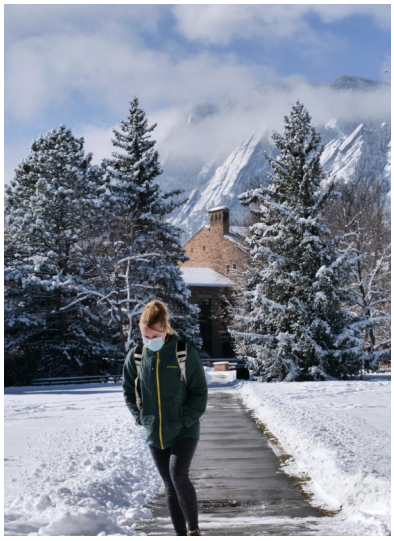
Mary Lau-Miki
Monique Lebourgeios
Christopher Link
Christopher Lowry
Michael Miki
Dale Mood
Russell Moore
Stacy Moore
Mary Murphy
Scott Murphy
Amanda Myhand
Cecily Northup
Joseph Paolilli
Tammi Paolilli
Nicole Record
Cristina Sanders
Neil Sanders
Matthew Schadow
Meghan Schadow
Cynthia Seals
Douglas Seals
Katharine Semsar
Bridgette Stramel
Cliff Summers
Tangi Summers
Larry Taylor
Taylor Thompson
Pei-San Tsai
Dixie Vandeputte
Gregory Vandeputte
Gayle Wright
Kenneth Wright, Jr.
Christy Yonz
American College of Sports Medicine Fund
Bank of America Charitable Gift Fund
Heroic Hearts Project
ImpactAssets, Inc.
Koop Endurance Services, LLC
Lever, LLC
Marjorie A Alexander Trust
Schwab Charitable Fund
Specialized Bicycle Components
STRYD Inc.



Ways to Give!!

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For info on more ways to give:
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We Want To Hear From You!!

Please reach out and keep us updated on what is happening in your professional and personal lives.
Send updates to **marsha.cook@colorado.edu**.