ROBERT BUCHWALD

7771 Nikau Dr. • Niwot, CO 80503
(303) 859-9263
robert.buchwald@colorado.edu

EDUCATION

POST-DOC. **UNIVERSITY OF CALIFORNIA, BERKELEY**
Department of Integrative Biology**,** 2006-2010
Biomechanics of insect flight & adaptations to high-altitude environment
Robert Dudley, Primary investigator

PHD. **UNIVERSITY OF COLORADO, BOULDER**
Department of Ecology and Evolutionary Biology**,** 2001-2006
The evolution of nestmate recognition in Apidae
Michael Breed (Major advisor), Marc Bekoff, Alexander Cruz, Alan R. Greenberg, John K. Hewitt and Yan B. Linhart

B.S. **UNIVERSITY OF TEXAS, AUSTIN,** *cum laude*
Section of Integrative Biology**,** 1994-1998
Larry Gilbert, David Begun – research advisors

EMPLOYMENT

2016-present: **Assistant Teaching Instructor:** University of Colorado, Boulder, Honors RAP
2010-2015: **Adjunct Instructor:** University of Colorado, Boulder, Honors RAP
2011-2015: **Adjunct Instructor:** Metropolitan State University of Denver, Biology

TEACHING

Teaching Professor – Honors General Biology I & II (EBIO 1210 & 1220), CU Boulder, 2013-2024
Designed specialized biology course for Honors students with a Biology major, taught in the Honors Residential Academic Program

Teaching Professor – Genetics (EBIO 2070), CU Boulder, Summer 2019-2024
Independently developed original course lectures, coordinated recitations with the Graduate Teaching Assistant

Instructor & Course Developer – Making the Self: Tools for Well-Being and Success in College (ARSC 1550), CU Boulder, Summer & Fall 2019
Collaborated with 9 other instructors to develop a new course for incoming first-year students that focuses on metacognition, building community, strengths and other skills for success at the college level

Instructor & Course Developer – Biology & Society (EBIO 1100), CU Boulder, Summer & Fall 2019
Collaborated with faculty and instructors to develop a new course for students interested in Biology that are not already Bio majors. The course focuses on active learning and big concepts in the field, integrating group work and interactive assessments, instead of traditional exams.

TEACHING, CONTINUED

Instructor – Ecology (EBIO 2040), CU Boulder, Summer 2016, 2018-2021
Developed course lectures, managed teaching assistants, organized weekly field trips, secured necessary permits, and held weekly meetings for Summer field course

Instructor – Honors Biology: A Human Approach (EBIO 1030 & 1040), CU Boulder, 2011-2018
Independently designed specialized biology course for non-science majors in the Honors Residential Academic Program (HRAP)

Instructor – Student Academic Skills Center (SASC) Program, General Biology I (EBIO 1210), CU Boulder Fall 2015, 2016
Designed specialized biology course for first-generation students, met 5 days a week lectured course material, organized peer work groups, developed problem sets and worksheets for students to work on in groups, managed undergraduate assistants

Coordinator – Ecology Labs (EBIO 2040), CU Boulder, Summer 2013-2014
Arranged, taught and organized all aspects of laboratory exercises for Ecology

Instructor – General Biology Lab I & II (BIO 1090 & 1091), MSUD, 2011-2015
Organized and taught lab and field exercises in molecular, developmental, and cellular biology, as well as ecology, evolution & diversity

Instructor – Biology: A Human Approach (EBIO 1030), CU Boulder, 2011-2015
Independently crafted introductory biology course to non-science majors in the summer term

Coordinator – Biology: A Human Approach Laboratory (EBIO 1050), CU Boulder, Spring 2011
Arranged, taught and organized all aspects of laboratory exercises for non-science majors

Instructor – General Biology I (BIO 1080), Metropolitan State Univ. of Denver, 2010-2015
Organized and taught introductory Biology course, focusing on molecular and cellular biology

Instructor – Principles of Ecology (EBIO 2040), CU Boulder, 2010
Independently designed & taught ecology course for Biology majors

Coordinator/Course developer - Animal Behavior Lab (EBIO 3240), CU Boulder, 2005
Designed and taught interactive lab sections, managed all prep work and animal care, ran pre-exam review sessions, co-authored all exams

Teaching Assistant – Animal Behavior Lab, CU Boulder (EBIO 3240), 2002-2005
Taught interactive lab sections & pre-exam reviews, co-authored all exams

Teaching Assistant – General Biology Lab (EBIO 1230 & 1240), CU Boulder, 2001-2002
Led lab exercises covering vertebrate anatomy, microbiology, evolution, DNA sequencing, human physiology, designed lab practical exams

Teaching Assistant – General Biology, CU Boulder (EBIO 1230 & 1240), 2001-2002
Assisted students with curriculum during office hours, proctored exams, led discussions on cell biology, molecular biology, anatomy, physiology, evolution, ecology

CURRICULAR DEVELOPMENT AND PEGAGOGICAL ENHANCEMENT

Online Teaching Academy, CU Boulder, 2024 – Accepted into eight week course on best practices and implementation for online teaching. Badge achieved. $1000 compensation.

Canvas Training, CU Boulder: Cidi Labs Design Tools Advanced, 2023 – Training covering the advanced elements available in Cidi Labs Design Tools, as well its accessibility options

Canvas Training, CU Boulder: Make Canvas Pop with Cidi Labs, 2023 – Training to enhance the aesthetic design and course navigation customization options in Canvas, and enhances student experience.

CURRICULAR DEVELOPMENT AND PEGAGOGICAL ENHANCEMENT, CONT.

EBIO 1100 course development, 2019 – Meeting weekly throughout the summer with other faculty in EBIO to develop a new course, EBIO 1100, Biology and Society. This course is designed for first-year students as an alternative to the traditional Gen Bio 1 & 2, and as a single-semester course with lab, can be an entry into the major by substituting for one semester of Gen Bio.

TRESTLE Scholars Program, Spring 2017 – participated in biweekly meetings with the group to discuss and implement evidence-based teaching practices

Metacognition Scholars Group, Spring 2016 – met with colleagues once a month to discuss metacognitive theory and try out exercises in our classrooms

SASC training 2015, 2016 – met for 4 days in August participating in trainings on best teaching practices, cultural sensitivity, micro aggression, inclusivity, and more

MENTORING

Honors Thesis Advisor

Mackenzie Kirk, 2024 – Evaluating Worst-Case Scenarios Amongst Anxious and Depressed Adults with Metastatic Cancer: A Qualitative Study. Department of Psychology & Neuroscience

Ava Altenbern, 2023 – Genetic Screen of the *B. subtilis pbuE* Adenine- Responsive Riboswitch Expression Platform Reveals Preferences for Base Pairing in the Nucleator Hairpin-Stem**.** Department of Integrative Physiology

Cassandra Blew, 2023 – Investigating the Relationship Between Neurofilament Light (NfL) Concentrations in Blood Plasma and Cognitive Task Performance in Healthy Older Adults. Department of Psychology & Neuroscience

Aaron Gafari, 2022 – j Discovering the Best Method of Judicial Selection: How Should State Supreme Court Justices be Placed onto the Bench? Department of Philosophy

Ashley Pak, 2022 – The role of the prelimbic cortex in controllability-dependent stress-induced changes in effortful reward-seeking behavior. Department of Integrated Physiology

Marqus Avalos, 2022 – Resilience and Mental Health in Sexual Minority Young Adults. Department of Psychology

Michelle Wolff, 2020 – "The Gaping Gap: Global and Local Environmental Awareness in Costa Rican Elementary Schools and an American University." Department of Geography

Rose Briggs, 2018 – "Honey we killed the bees: Effectiveness of US Federal, State and Municipal Neonicotinoid policies in mitigating managed honey bee colony loss." Department of Geography

Michaela DaMato, 2016 – "Wolves in the west: A program analysis of wolf reintroduction programs in the Western United States." Department of Geography

Eileen Sherman, 2016 – "Parent Licensing." Department of Psychology

Melina Roth, 2015 – "Effects of provisioning on the behavior of the Allied Rock Wallaby (*Petrogale assimilis*)." Department of Ecology & Evolutionary Biology

Undergraduate Research Apprentice Program Mentor, 2009

Supervised two students from underrepresented backgrounds in research methods, data analysis, insect rearing and scientific presentation

UC Berkeley Haas Scholar Mentor – 2006-2008

Worked with foreign visitor on his project, delegated responsibility for assistance with research

UC Berkeley Undergraduate Research Apprentice Program Mentor, 2006

Helped undergraduate honors student develop her project idea, collect data, trouble-shoot design flaws, analyze results and compose presentation for student forum

MENTORING, CONTINUED

Research Experience for Undergraduates (NSF) Mentor, 2003-2004
Assisted with development, data collection, analysis and presentation of student research projects, designed and taught introduction to alpine ecology courses at the University of Colorado Mountain Research Station

SERVICE

TO HONORS RESIDENTIAL ACADEMIC PROGRAM (PRIMARY UNIT)

Student Field Trips – Independently organized, secured permissions and permits, and rented vehicles for co-curricular field trips
Cadaver Labs, 2012-2019
RMNP hikes, 2018-2023
Climb with a Prof, 2023-2024

Faculty in Residence, Smith Hall, 2017-2019 – Interacted with first-year students on a day-to-day basis, as well as more formally through structured activities, including taking students to **Faculty Tuesday concerts** at Imig music, inviting students to our apartment for **Dinner,** taking students to the **CU Climbing gym** for instruction and fun, hosting **TV viewing parties** for Game of Thrones, Rick & Morty and others.

Associate Director, Honors RAP, 2015-2017 – Assisted director with contracts, scheduling, co-curricular activities, FLOCK student leader activities and meetings, etc.

TO ARTS & SCIENCES HONORS PROGRAM

Sci Talks, 2019-2023 – Created and presented TED-style talks to students about topics within my expertise, including **Biology of Honeybees, The Science of Good Cooking, All About the Coronavirus.**

TV with a Prof, 2014-2019 – Hosted a free seminar once a semester, organized through the Honors Program, where I presented an hour of television and then analyzed it academically with student input and discussion, including **Planet Earth**, **Black Mirror**, **Narcos**, and **Orphan Black**

TO UNIVERSITY

Undergaduate Research Opportunities Program (UROP) Application Review, 2020-2024
Evaluated undergraduate research and creative project proposals in my academic area of expertise

Norlin Scholars Selection Process Application Review, 2020-2024 – Evaluated applications for Norlin Scholars Program

Boulder Faculty Assembly representative for Honors, 2018-2021
BFA Administrative Services & Technology Committee member, 2018-2022
BFA Instructor-Track Faculty Affairs Committee, 2020-2022

AWARDS/FELLOWSHIPS/GRANTS

ASSETT Award of Excellence – Outstanding Teacher for Technology in Teaching, 2014
ASSETT Award of Excellence – Outstanding Teacher for Technology in Teaching, 2013
National Science Foundation (NSF) Minority Postdoctoral Research Fellowship, 2006-2010.
$180,000 for 4 years of salary, equipment and travel funds to early-career scientists for innovative and vital research.

AWARDS/FELLOWSHIPS/GRANTS, CONTINUED

Graduate Student Research and Creative Work Award, 2006.
Only 3 awards each year are given to graduate students across all disciplines for outstanding and distinguished research.

Institute for Behavioral Genetics Graduate Training and Interdisciplinary Certificate Program, 2003-2006.
Stipend plus tuition waiver for 3 years to facilitate the study of behavioral genetics via coursework, seminars, mentorship and teaching.

Chancellor's Graduate Fellowship, 2001-2003.
Stipend plus full tuition waiver for 2 years awarded to outstanding students entering the University.

Chancellor's Minority Fellowship Travel Grant, 2002.
Competitive grant for travel to international meetings.

PUBLICATIONS

PEER-REVIEWED ARTICLES

Breed, M. D., C. A. Lyon, A. Sutherland & R. Buchwald. 2012. Use of flax oil to influence honey bee nestmate recognition. **Journal of Economic Entomology, 105**, 1145-8.

Buchwald, R. & R. Dudley. 2010. Limits to vertical force and power production in bumblebees (Hymenoptera: *Bombus impatiens*). **Journal of Experimental Biology**, **213**, 426-432.

Buchwald, R., A. R. Greenberg & M. D. Breed. 2009. Neutral substitution of olfactory cues and the evolution of phenotypic diversity used in social recognition, **Apidologie, 40**, 585-594.

Buchwald, R., A. R. Greenberg & M. D. Breed. 2008. The thermal properties of bees' waxes: unexpected findings. **Journal of Experimental Biology**, **211**, 121-127.

Breed, M. D., F. Liu, X. B. Deng & R. Buchwald. 2007. Comparative studies of nestmate recognition and intraspecific colony defense in Asian honey bees, *Apis florea, Apis dorsata*, and *Apis cerana*. **Apidologie 38**, 411-418.

Buchwald, R., A. R. Greenberg & M. D. Breed. 2006. Interspecific variation in beeswax as a biological construction material. **Journal of Experimental Biology**, **209**, 3984-3989.

Buchwald, R. & M. D. Breed. 2005. Nestmate Recognition Cues in a Stingless Bee, *Trigona fulviventris*. **Animal Behaviour**, **70**, 1331-1337.

Buchwald, R., A. R. Greenberg & M. D. Breed. 2005. A biomechanical perspective on beeswax. **American Entomologist**, **51**, 39-41.

BOOK CHAPTERS

Breed, Michael D. & Buchwald, R., Editors. **Coloss BeeBook, Volume III: Standard Methods in Honey Bee Product Research**. *In prep*.

Breed, Michael D. & Buchwald, R. Cue diversity and social recognition. In **Organization of Insect Societies – From Genomes to Socio-complexity**, Gadau, J. & Fewell, J. Eds. Harvard University Press, Cambridge, Mass., 2009.

POST-DOCTORAL RESEARCH

THE BIOMECHANICS OF INSECT FLIGHT AND ADAPTATIONS TO THE HIGH-ALTITUDE ENVIRONMENT

National Science Foundation (NSF) Minority Post-Doctoral Fellowship

Bumblebees are model organisms for studying insect flight because they display an extremely high mass-to-wing size ratio, are found across wide elevational gradients and show varied size polymorphisms within species. For my post-doctoral research I have several projects at or near completion. I evaluated methods for testing maximum vertical force production in flying animals. I surveyed how flight performance is related to differences in morphological variables (allometry). I pioneered a method for examining the effects of high-altitude conditions on bumblebees – measuring colony growth, investment in reproductives, muscle-mass development and flight performance. With Dr. Sanjay Sane, I investigated how mechanosensory input from the antennae affect flight maneuverability, and with Dr. John Swallow examined how eye-stalk length affects maneuverability in tropical stalk-eyed flies.

GRADUATE DISSERTATION

THE EVOLUTION OF NESTMATE RECOGNITION IN APIDAE

Institute for Behavioral Genetics Graduate Training and Interdisciplinary Certificate Program

Honeybees discriminate nestmates from non-nestmates using chemical cues acquired from exposure to comb wax. My graduate research followed two lines of novel inquiry: 1. Investigating whether other bee species display this behavior and drawing evolutionary conclusions. 2. Examining how the chemicals used in nestmate recognition contribute to the thermal and mechanical properties of beeswax. By integrating lab work with field work in Costa Rica, southwestern China and Colorado, I discovered new relationships across the fields of chemical ecology, ethology and evolutionary biology.

OTHER SKILLS: Proficient in conversational Spanish