

BIOLOGY STUDENT
NEWSLETTER

AUTUMN 2021

ISSUE 39

IMPORTANT DATES
FOR AUTUMN QUARTER

Sept 29	First Day of Instruction
Oct 5	Last day to drop a class without a fee thru MyUW
Oct 6	All courses require entry codes to add and fee
Oct 8	Last Day to apply to Biology major in Autumn
Oct 12	Last Day to drop a class without the use of the Annual Drop
Oct 19	Last Day to add a class through MyUW
Oct 29	Dr Millie Russell Day
Nov 3	Last Day to Apply for Grad Reg Priority GSP for Winter
Nov 5-21	Win Reg Priority Period 1
Nov 11	Veterans Day Holiday
Nov 16	Last Day to convert to S/NS
Nov22-Jan2	Winter Reg Period 2
Nov 25-26	Thanksgiving & Day After
Dec 10	Last Day to Withdrawl (from all Aut Qtr classes)
Dec 10	Last Day to use ANNUAL DROP
Dec 11-17	Final Examination week
Dec18- Jan2	Winter Break
Jan 3	Winter Quarter Starts

A MESSAGE FROM THE CHAIR OF THE DEPARTMENT



David Perkel, Chair of Biology

Dear UW Biology community,

I hope you had an enjoyable summer break and are returning to UW Biology well-rested and ready for a great quarter ahead. I'd like to extend a hearty welcome to our new undergraduate majors and our seventeen new graduate students – we are thrilled to have you join us.

While summer break is naturally a time for some much-needed R&R after the school year, our talented community here at UW Biology found time to continue their work.

You may have also seen some of them in the news! If you spent any time in the Pacific Northwest at the end of June, the historic summer heat wave is probably an event that you will remember for years to come. Professor Emily Carrington was interviewed on CNN and wrote an opinion piece in *The Guardian* on the “heat dome” and its effects on sealife. Sharlene Santana and Jeff Riffell published work on the role of scent compounds in the coevolution of bats and pepper plants. Briana Abrahms opined on how climate change is increasing human-wildlife conflict. Adam Summers group released work on 3D imaging of shark intestines. And Greg Wilson Mantilla's team spent a highly productive summer field season discovering 4 new dinosaur fossils. These are just a few of the new findings coming out of UW Biology research efforts.

In exciting news, our plants were moved back into the UW Biology Greenhouse from their temporary location in Redmond at the end of summer! We are looking forward to welcoming our students into the Greenhouse space to learn all that they can from our extensive teaching collection. An official Greenhouse opening event will be held sometime in Spring 2022, so keep your eyes peeled for more information on that to come!

It is an understatement to say that this is an uncertain time. I know that this Autumn quarter will be a transition for us all. More than a year and a half ago, our worlds were turned upside down by the Covid-19 pandemic. As challenging as the move to remote learning was, it may be even more of a challenge adjusting to the return to campus. We understand that there will be a full spectrum of emotions about the move back to in-person instruction, but please know that we here at UW Biology are here to support you. The department has spent the summer actively preparing for a safe return to an in-person autumn quarter and we look forward to seeing our classrooms vibrant with students once again. We are also planning additional support for those students who have made the transition to university-level learning entirely remotely. My sincere thanks go to our faculty and staff who have been working hard behind the scenes to get the department as prepared as we can be going into this Autumn quarter. We are all working side by side, doing our best to innovate, collaborate, and discover. I am inspired daily by our UW Biology community. I wish you all a wonderful start to the new school year.

Best wishes,

David Perkel, Professor and Chair, Department of Biology

HOW DO I TALK TO AN UNDERGRADUATE ACADEMIC ADVISOR? Use Email or Zoom!

Biology Academic Services in-office advising & services are closed and will be remote-only until further notice.

We welcome UW and prospective students to contact us with any questions regarding a Biology option. **Here are the advisors, their emails and a little bit about what they did this summer.**



Janet Germeraad
Academic Services Director
Janetjg@uw.edu

I went in search of outdoor live music: Willie Nelson & Friends in Texas & Jimmy Buffett in Colorado and visited national parks in between, all of which I was wearing my mask!



Jason Patterson
Academic Counselor, Senior
patterj@uw.edu

This summer was tame, but I got to harass my godchildren and acted as free labor: building, fixing and moving stuff for the family before I escaped back to Seattle.



Sheryl Medrano
Academic Counselor, Senior
smedrano@uw.edu

When I wasn't working or chasing around my toddler, I was floating on Lake Washington and Puget Sound on my new inflatable stand-up paddleboard--the toddler named her Baby Beluga.



Julie Martinez
Program Coordinator
juliebio@uw.edu

I really like spending time this summer with my great-Onieces. They bring so much joy & happiness into my life.

AUTUMN QUARTER 2021 ACADEMIC ADVISING (REMOTE-ONLY)

Zoom drop-in advising hours (10-15 min meetings):

Monday - Thursday 9 a.m. - 12:00 p.m. and 1:00 p.m. - 4:00 p.m.

Join Zoom Meeting: <https://washington.zoom.us/j/92869479267> (link is external)

Meeting I.D.: **92869479267**

Zoom advising appointments*:

Please email an adviser to make an advising appointment for longterm planning.

***Please note that we are available for drop-in advising only during the first week of registration.**

For general questions, you may reach us at: bioladv@uw.edu or at 206-543-9120

Current / prospective students, parent, and community questions not addressed by our webpage will receive an answer. Academic Services Staff will closely monitor this email account to ensure a timely response and make phone or other Zoom appointments to address concerns.

Please consult the website first for general answers on: advising, admission, degree plans, matrix of courses, and forms

CREATION OF COVID-19 VACCINES Are Based on Decades of Basic & Applied Research

In order to protect the health and safety of our community, the University of Washington is requiring all students and employees to be vaccinated against COVID-19, with certain exemptions allowed.

The FDA-authorized vaccines — which are based on technology that's been under development for more than two decades — are safe and effective. Widespread vaccination is our ticket to a return to in-person learning and working as we create the 'new normal' for our University, and we encourage you to get vaccinated as soon as you're able,"

wrote UW President Ana Mari Cauce and Provost Mark Richards.

The Covid-19 vaccines did not come from nowhere. Decades of research by tens of thousands of scientists worldwide put in place the essential basic knowledge and methods that underpinned their rapid development.

With China's release of the gene sequences for the virus that is causing the outbreak, scientists around the world were pouring over them for clues on where the virus came from, how lab officials might test for it, and how it might behave.

This virus was a coronavirus. The word corona means crown and refers to the appearance that coronaviruses get from the spike proteins sticking out of them. Coronaviruses are a large family of viruses that can infect people and many animals, including camels, cattle, cats, and bats. There are many types of coronaviruses, including some that give people a common head or chest cold. Other coronavirus diseases like severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) are extremely dangerous but are much less widespread than colds and COVID-19.

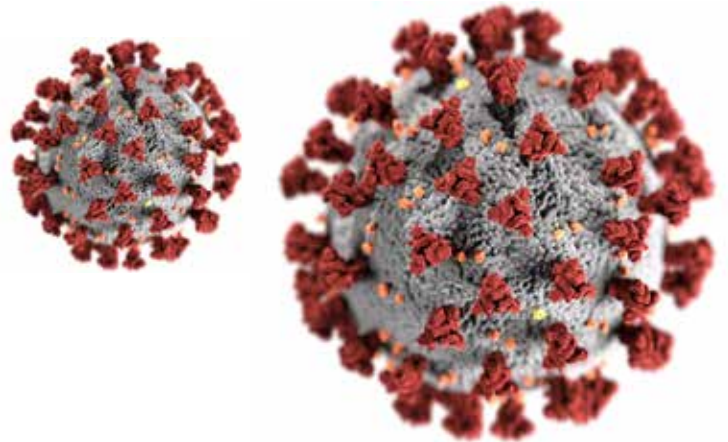
On February 11, 2020 The ICTV (International Committee of Taxonomy of Viruses) announced the virus's name SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), and the World Health Organization announced an official name for the disease: Coronavirus disease 2019, abbreviated COVID-19. 'CO' stands for 'corona,' 'VI' for 'virus,' and 'D' for disease, and 19 for the year the outbreak was first recognized Dec 2019.

Research over the past two decades on the earlier severe acute respiratory syndrome (SARS) virus and its cousin, the virus that causes Middle East respiratory syndrome (MERS), taught virologists and vaccine designers a great deal about coronaviruses, their vulnerabilities, and how they might best be exploited.

This group of researchers with critically important knowledge of this virus family was able to guide the scientific community in how to respond to the Covid-19 pandemic.

As of July 2021, 20 vaccines are authorized by at least one national regulatory authority for public use: two RNA vaccines (Pfizer–BioNTech and Moderna), nine conventional inactivated vaccines (BBIBP-CorV, Chinese Academy of Medical Sciences, CoronaVac, Covaxin, CoviVac, COVIran Barakat, Minhai-Kang-

tai, QazVac, and WIBP-CorV), five viral vector vaccines (Sputnik Light, Sputnik V, Oxford–AstraZeneca, Convidecia, and Janssen (J&J)), and four protein subunit vaccines (Abdala, EpiVacCorona, Soberana 02, and ZF2001). In total, as of July 2021, 330 vaccine candidates are in various stages of development, with 102 in clinical research, including 30 in Phase I trials, 30 in Phase I-II trials, 25 in Phase III trials, and 8 in Phase IV development.



Basic research is curiosity driven. It is motivated by a desire to expand knowledge and involves the acquisition of knowledge for knowledge's sake. It is intended to answer why, what or how questions and increase understanding of fundamental principles. Basic research does not have immediate commercial objectives and although it certainly could, it may not necessarily result in an invention or a solution to a practical problem.

Applied research is designed to answer specific questions aimed at solving practical problems. New knowledge acquired from applied research has specific commercial objectives in the form of products, procedures or services.

Fundamental research answers the initial question of how things work. This fundamental knowledge is then used by applied scientists and engineers, for example, to make improvements on existing products, technologies and processes. Likewise, basic researchers take advantage of improved technologies to answer new fundamental questions. It is an important cycle for advancement.

RAW MILK NEEDS TO BE PASTEURIZED Alice Catherine Evans



Brucella abortus

ALICE CATHERINE EVANS

Born 1881-1975 Pennsylvania



Evans lived at a time when microbiology was in its infancy. In 1864, French biologist and chemist Louis Pasteur had described his system for preserving liquids by heat —pasteurization— but at that time it was applied to wine or beer, not to milk, which was believed to be safe as long as it was not contaminated. However, the speed with which milk spoiled made it a very dangerous food. In the past, dairy farms were sometimes located in the cities to reduce the time between production and consumption, but the disappearance of these establishments led in some cases to the use of adulterants to disguise the spoilage, such as bicarbonate, sugar, molasses or even chalk.

At that time, knowledge of the diseases associated with raw milk was still very limited. It was known that a bacterium, *Bacillus abortus*, spread between animals, causing spontaneous abortions. In humans, Malta fever was caused by *Micrococcus melitensis*, found in the milk of Maltese goats. However, no one had ever thought of linking these two ailments, until a bacteriologist, Alice Evans from the US Department of Agriculture (USDA), dedicated time to investigating the bacterial flora in milk.

Evans was introduced to the study of natural sciences through a course that Cornell University offered free of charge to rural teachers, her occupation at the time. Fascinated by biology, she took advantage of an opportunity that Cornell offered to study agriculture also free of charge, and which allowed her to select a scientific specialty, bacteriology. But when the time came to choose between a doctorate or a research position in the USDA's Dairy Division, she chose the research.

Evans discovered that *B. abortus* was present in raw milk on a regular basis, contrary to the prevailing view that this product was safe. By studying and comparing this microbe to *M. melitensis* in goats, she noted that they were almost identical. In 1917 she presented her findings to the American Society of Bacteriologists, and the following year she published them in the *Journal of Infectious Diseases*. Evans' claimed that normal raw milk could cause disease in humans, and that this risk was eliminated by pasteurization. She was met with skepticism, particularly because she was a woman and did not have a Ph.D. Evans said of her critic Dr Theobald Smith, he was not accustomed to considering a scientific idea proposed by a woman.

Evans' work was corroborated by other experts, and in 1920 a new genus, *Brucella*, was proposed to encompass the former *B. abortus* and *M. melitensis*. Her findings led to the pasteurization of milk in 1930. As a result, the incidence of brucellosis in the United States was significantly reduced.

TOP SECRET MALARIA PROJECT FINDS AN ANCIENT CURE Tu Youyou



Plasmodium

TU YOUYOU

Born 1930 Ningbo, China



Tu Youyou turned to Chinese medical texts from the Zhou, Qing, and Han Dynasties to find a traditional cure for malaria, ultimately extracting a compound – artemisinin – that has saved millions of lives. When she isolated the ingredient she believed would work, she volunteered to be the first human subject. She is the first mainland Chinese scientist to have received a Nobel Prize in a scientific category, and she did so without a doctorate, a medical degree, or training abroad.

At Beijing Medical College, Tu studied pharmacology, learning how to classify medicinal plants, extract active ingredients and determine their chemical structures. When she graduated in 1955 at the age of 24, Tu was assigned to work at the newly established Academy of Traditional Chinese Medicine, where she would stay for her entire career. From 1959 to 1962, she took a full-time course in traditional Chinese medicine for researchers trained in modern Western methods.

North Vietnam asked China for help with battling malaria, which was causing tremendous casualties among its soldiers in the Vietnam War. The single-celled parasite that causes malaria had become resistant to chloroquine, the standard malaria treatment. Chairman Mao Zedong launched top secret Project 523 on 23 May 1967 to find a cure for chloroquine-resistant malaria. In 1969, when she was 39 years old, Tu was appointed head of Project 523. Her first order of business was researching the effects of malaria in situ. And for that, she traveled to Hainan Island in southern China, which was currently experiencing a malaria outbreak of its own. Upon their return to Beijing, the team reviewed ancient medical texts to understand traditional Chinese ways of fighting malaria. At that point over 240,000 compounds had already been tested for use in potential antimalarial drugs, and none had worked. Finally, the team found a reference to sweet wormwood, which had been used in China around 400 AD to treat "intermittent fevers," a symptom of malaria.

In 1971, Tu's team isolated one active compound in wormwood that seemed to battle malaria-friendly parasites. They tested extracts of the compound but nothing worked. So Tu returned once more to the ancient text. She wondered whether the active ingredient in wormwood was being damaged when they boiled the wormwood to prepare the solvent, and so she tried another preparation, this time with an ether-based solvent. Since it boils at a lower temperature, the wormwood wasn't damaged; when she tested it on mice and monkeys, it had a 100 percent success rate.

Tu and two colleagues tested the substance on themselves before testing them on 21 patients in the Hainan Province. All of them recovered.

It took two decades, but finally the WHO recommended artemisinin combination therapy as the first line of defense against malaria. The Lasker Foundation, which awarded Tu its Clinical Medical Research Award in 2011, called the discovery of artemisinin "arguably the most important pharmaceutical intervention in the last half-century."

AT 23, BALL DEVELOPED A LEPROSY TREATMENT Alice Augusta Ball

Mycobacterium leprae

ALICE AUGUSTA BALL
Born 1892-1916 Seattle, Washington



1911-1912 UW Tyee yearbook

Alice Augusta Ball was a list of firsts at the time: the first and only woman to earn a master's degree at the College of Hawaii, the first woman to be a chemistry instructor there and, most importantly, the first person to extract a chemical that led to a treatment for leprosy. Incredibly, her achievements in the early 1900s were virtually forgotten -- until a federal retiree named Stan Ali stumbled upon a reference to her in 1997 while researching African Americans in Hawaii.

The resurrection of Ball's life came on two fronts. Stan Ali, who visits the islands annually from Baltimore, became intrigued and dug up most of the details after reading a brief mention of research done by a "young Negro chemist" in a 1932 book, "The Samaritans of Molokai," by Charles Dutton.

Meanwhile, three U of Hawai'i-Mānoa staff members -- Eileen Tamura of the Curriculum Research and Development Group, Allen Awaya of the College of Education, and Warren Nishimoto of the Center for Oral History -- were delving into the history of the university, formerly the College of Hawaii, and came across Ball's name in 1998.

According to Ali's findings, Ball was born in 1892 and moved with her family from Seattle to Oahu in the early 1900s. Her father was a lawyer & her mother was a photographer. Ball attended eighth grade at Central Grammar School in Honolulu before her family moved back to Seattle.

Ball eventually graduated from the University of Washington with a degree in pharmacology. She arrived at the College of Hawaii in 1914, and earned a master's degree in science the next year while working at a Kalihi hospital. Her Master's thesis, "The Chemical Constituents of Piper Methysticum," identified the active ingredients of the KAVA root.

Chaulmoogra oil, located in the seed, was known for centuries by Indian and Chinese practioners to help leprosy patients, but with limited success. Used topically, it didn't penetrate deep enough. Orally, it was quite bitter and caused stomach upset and nausea. Injected, it was extremely painful and created cysts at the injection site since oil does not mix with water!



Chaulmoogra fruit

Dr. Harry Hollman, a U.S. Public Health Officer was working at the Kalihi Hospital, where leprosy patients were seen before sending them to Kalaupapa, Molokai. He believed the Chaulmoogra oil could be of great help if it could become water soluble. He contacted Alice Ball to see if she could identify and isolate the active ingredients of the Chaulmoogra oil.

In between teaching students at her university, Ball tried to purify the oil into chemical compounds called ethyl esters so it can be successfully injected. To do this, the oil first needs to be converted into fatty acids. Ball had a eureka moment. She realises the acid needs to be frozen overnight to give enough time for the esters to separate, as well as to stop them degrading at room temperature. She isolated the chaulmoogric acid and hydrocarpic acid contained in the oil and made the first water soluble injectable treatment for leprosy that could be safely injected, with minimal side effects.

Although her name became obscure, Ball's findings were not neglected. Arthur L. Dean, a college chemist who became a UH president, picked up on them to develop a partially effective leprosy treatment that became known worldwide as the "Dean Method," used until more effective sulfones became available in the 1940s.

Dean did not credit Ball's work in any articles or interviews found by Ali or Paul Wermager, head of Hamilton Library's Sci & Tech. Reference Dept, who researched the matter while preparing a library exhibit. Wermager did find an article by Hollman in a 1922 medical journal in which the public health officer goes to unusual lengths to refer to "Ball's Method" and her "great amount of experimental work." Wermager's hypothesis: Hollman was "either settling an old score or righting a wrong." "Ball did the breakthrough, she had the eureka moment. Hollman clears the record."

Clear or not, recognition was sparse. In 1917, College of Hawaii students and faculty passed a resolution so Ball could "be an example to all her companions and associates at the College." And in 1925, according to a local news account, Ball received posthumous praise after a medical conference in Japan -- although people assumed she was part-Hawaiian and not black. Other than that, she was barely recalled.

Ali attributes the neglect to the sexism and racism of the times. Ball's birth and death certificates list her and her parents as white, which Ali believes was done to make travel, business and life in general easier. He feels the newspaper article also provides a clue. "When they realized she was not part-Hawaiian, but Negro, they felt they had made an embarrassing mistake, forgetting about it and hoping it would go away," he said. "It did for 75 years."

Ali, whose research Tamura and Wermager praised, intends to bring Ball to the attention of mainland African American leaders. Had Ball lived longer, he said, "it boggles the mind what she would have accomplished."

Ball finally got the recognition, more than eight decades after her groundbreaking work: In 2000, the World Health Organization declared that leprosy had been eliminated as a global public health problem, due to effective multi-drug treatments.

In 2000, after being brought to light of Alice Ball's role, the U.of Hawai'i-Mānoa planted a Chaulmoogra tree on the campus near Bachman Hall.

On February 29, 2000, the Lt Governor Mazie Hirono of Hawaii issued a proclamation, declaring it "Alice Ball Day" to be celebrated every 4 years. On the same day the University of Hawaii recognized its first woman graduate and pioneering chemist with a bronze plaque mounted at the base of the Chaulmoogra tree on campus.

In January 2007 the Board of Regents of the University of Hawaii honored Alice's work and memory with its highest award: the Regents Medal of Distinction (posthumously conferred). The medal is on display in Hamllton Library alongside her portrait.



Chaulmoogra Tree at UH

In 2017, Paul Wermager, a scholar of Ball's life, established a scholarship in honor of Alice Augusta Ball, to support students of the College of Natural Sciences pursuing a degree in chemistry, biology or microbiology.

LOCAL ALICE BALL RECOGNITION IN SEATTLE Park in Greenwood Named for Her



Alice Ball Park—originally known by the community as “Library Park” opened June 14, 2019. Located just north of the Greenwood Library that was rebuilt in 2017, the park is a multi-use space for visiting, playing, reading, and attending community events.

Seattle Parks and Recreation put out a call to the community for ideas to name the park. Jesse Ballnik, Phinney Neighborhood Association Member and then a third-grader at Daniel Bagley Elementary, spearheaded the campaign for the name. Jesse’s mother Jami Clausen, said Jesse learned about Alice Ball in a book called *“Goodnight Stories for Rebel Girls 2”*.

Jesse created a U-Tube video (<https://www.youtube.com/watch?v=p2gyPT69Lv4>) about why the park should be named after Alice Ball. In her video she said, “There is a new park opening up next to the Greenwood library.” “We think it would be wonderful if that park could be named after Alice Ball so kids could remember that learning can change lives, and that learning can look like all of us.” She launched her campaign to convince the Seattle Parks and Recreation to name the small park after Alice Ball by creating postcards for neighbors to send to the City, plus garnered letters of support from local businesses and scientists. The push succeeded. The name selected was Alice Ball Park, after Seattle chemist Alice Ball.

Alice Augusta Ball is now the namesake of a park in the city where she was born. It’s taken 100 years, but this pioneering black woman chemist is finally taking her place in the history of science, and in bedtime stories for rebel girls everywhere.

Good Night Stories for Rebel Girls 2 is a children’s book packed with 100 bedtime stories about the life of 100 extraordinary women from the past and the present, illustrated by 60 female artists from all over the world. Age range 5-10.



INTERNATIONAL RECOGNITION IN LONDON School of Hygiene and Tropical Medicine

In 2019 the London School of Hygiene and Tropical Medicine inscribed Alice Ball’s name on its facade along with Florence Nightingale and Marie Skłodowska-Curie. Their names were added to twenty-three other science and medicine innovators—all men—in celebration of the institution’s ninetieth anniversary.



WELCOME! Seventeen New Graduate Students and Their Labs



Chris Anderson
BROSI LAB



Edu Baptista Guerra
SANTANA LAB



Benjamin Downing
NEMHAUSER LAB



Jacob Evarts
BAGHERI LAB



Yu-Wei Hsiao
LEACHE LAB



Wesley Hull
RUESINK LAB



Sandeep Jandu
RIFFELL LAB



Erik Johansson
ABRAHMS LAB



Erik Johansson
ABRAHMS LAB



Kyra McClelland
WASSER/RUESINK LAB



Kirsten Meltesen
WILSON LAB



Jennifer Ortiz
SWALLA LAB



Ben Sheppard
STEINBRENNER LAB



Janet Solano Sanchez
NEMHAUSER LAB



Madeleine Strait
BROSI LAB



Grace Van Susteren
RIFFELL LAB



Leigh West
ABRAHMS LAB

*Please note the cats are
place holders for Jacob &
Ben and not in the program.*

PEACE CORPS

Hello to all!

My name is Jessica Phares, and I am the incoming Peace Corps recruiter for the 2021-2022 school year. I did my service with the health sector from 2017-2019 in Madagascar. During my time with the Peace Corps, I was able to use the skills that I learned in the classroom to implement programs that promoted the health of women and children. If you have any questions, or would like to learn more about the Peace Corps, please visit peacecorps.gov, or email me at pcorps@uw.edu.

My office hours are from 10:30 am-11:30 am Tuesday, Wednesday, and Thursday at the Career & Internship Center at Mary Gates Hall, or by appointment. I look forward to meeting you!



Peace Corps

OUR OWN PATHOGEN BIOLOGY RESEARCHERS What Inspires Them?



BEN KERR

What is your research or interest in?

The Kerr lab is interested in how biological interactions evolve. This interest ranges from the molecular to the ecological. We're interested in how mutations in different parts of an organism's genome interact to affect the organism's fitness. However, we're also interested in how different organisms in different species interact through competition, exploitation, mutualism and cooperation—and what factors determine evolutionary changes to the form of ecological interaction. We address these issues using evolution experiments with bacteria, where changes in molecular and ecological interactions can be tracked in real time under environmental conditions that we specify. As some bacteria are pathogenic, some of the themes we study have implications for disease evolution, including the evolution of pathogen virulence and the spread of resistance to antibiotics.

What is your favorite part of your research?

Bacteria can be frozen in suspended animation indefinitely, but revived at any time. This means that when we perform an evolution experiment and freeze samples of an evolving population over time, we have a "living fossil record" for our experimental populations. This living record allows us

to compete descendants directly against their ancestors, assess various properties of an entire evolutionary lineage at the same time, and determine specific changes in genomes that lead to evolutionary changes. Using this approach, we have studied how properties such as cell size, metabolism, growth rate, and antibiotic resistance change over time, how environmental factors influence the change, what mutations underlie the change, and how repeatable evolution itself is.

Who or what inspired you to do the research you do today?

As an undergrad, I decided to major in biology after taking a course in animal behavior given by a captivating instructor. I was fascinated by the organisms we discussed, from vervet monkeys altruistically giving alarm calls to protect group members from predation, to bees communicating through dance about locations of food sources. However, when the conversation turned to evolution, the ultimate causes behind these mesmerizing behaviors started coming into focus, which was completely revelatory for me. Although I didn't realize it fully at the time, that class initiated a path leading to my current research. Even though our lab works on microbes, our central questions echo some of the prominent topics from this animal behavior course: how do organisms interact with one another (i.e., via cooperation, competition, communication) and how do such interactions evolve?

Do you have any advice to give a student wanting to do research?

First and foremost, I would say that if you are excited to dive into scientific research, then that is a wonderful testament to your curiosity about the natural world! It is absolutely possible for you to make significant contributions, even changing the way we think about well-studied systems.

If you know something about the research you're interested in (the question, the study system, the techniques, etc.) a good starting place is to ask instructors, TAs, advisors and your peers familiar with such research about candidate labs. However, a shared interest in the research is only one part of what will make a research experience enjoyable and productive. It is also worth getting some information about the mentorship culture within your target lab (How collaborative are group members? How do new members get oriented? How much contact do mentors have with their mentees?). This can be done by reaching out to other students in the group (or, in some cases, reading about the lab's mentoring philosophy on their website). If both the research area and the mentorship culture are a good fit, it is a good idea to contact the primary investigator to inquire about open positions in their group (expressing the reasons why you're interested in their work and a little about your background). Not all students are in financial circumstances where they can volunteer to do research; however, there are opportunities to get paid to do research (via awards, scholarships, federally funded grants, or special programs that often run over the summer). If this is your situation, contacting instructors and advisors about paid positions is a good starting place.

Once you find a supportive and engaging place to do your research, look for opportunities to communicate your work (with new collaborators, in lab meetings, in research symposia, and at scientific conferences). If you find that you enjoy conducting research and communicating your results, your research experience could be the first step towards a fulfilling career in science. Good luck!

One Research Area: Disease evolution and the tragedy of the commons

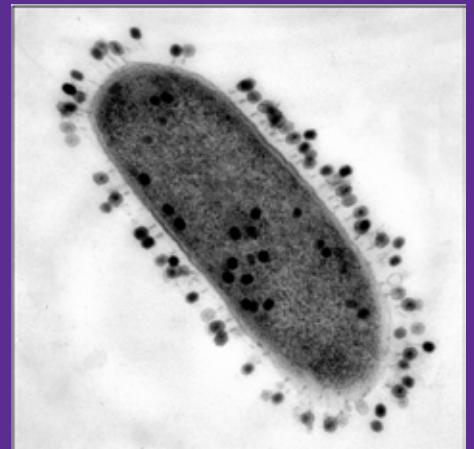


Figure 1: A micrograph of an E. coli cell being infected by several T4 particles (TEM courtesy of J. Wertz). The virus binds to the surface of the bacterium and injects its DNA. After production of new phage particles, the bacterium lyses and the viral progeny are released.

OUR OWN PATHOGEN BIOLOGY RESEARCHERS What Inspires Them?



CARL BERGSTROM

BERGSTROM LAB

In order to anticipate and to contain disease spread and disease evolution, we need to understand the underlying population biology and population genetics of both pathogen and host. Conversely, through the wealth of available data and the rapidity of the pathogen evolution, infectious disease biology offers to population biologists an opportunity to observe evolution taking place in "real time," and as such provides a rich set of study systems for biologists who are interested in the basic ecological and evolutionary principles. In the past I have worked on the threat posed by antibiotic resistant bacteria and on the processes by which zoonotic pathogens such as H5N1 Avian Influenza (bird flu), SARS coronavirus, and Ebola virus emerge into human populations.

Dr Bergstrom's Webpage: <http://ctbergstrom.com>



ALEX PARADEZ

THE PAREDEZ LAB

Studies Giardia lamblia, a neglected protozoan parasite. Giardia infects more than 100 million people each year worldwide and is also the most prevalent intestinal parasite in the United States. Giardia belongs to an early branching group of eukaryotes known as Excavates. Notably, Giardia lacks several conventional organelles and has a minimalistic

genome without many well studied proteins and pathways that are essential for its mammalian host. The focus of the Paradez lab is identification of essential yet divergent cellular processes in Giardia that can be leveraged against the parasite for novel therapeutic interventions. Our interest in Giardia also extends to the power of its minimalism in revealing broadly interesting fundamental principles of cell biology.



Giardia lamblia

Dr Paradez's Webpage: <http://paredezlab.biology.washington.edu>



JUSTINE LIEPKALNS

TEACHING PROFESSOR

I consider myself an educator and an immunologist with a specialty in virology and red blood cell immunology. I have taught classes since 2008 and aim to form communities within my classrooms. Outreach opportunities and igniting projects are always of interest. As an example, two Freshmen students used crowd sourcing to design a detection method to help screenings during the 2014 Ebola outbreak and submitted an application to the U.S. Patent and Trademark Office. Think of ways you could start a project!

Dr Liepkalns's profile: <https://www.biology.washington.edu/people/profile/justine-liepkalns>



JULIE THERIOT

THERIOT LAB

The research of our group explores the mechanics and dynamics of cell self-organization and movement in a variety of cells ranging from bacteria to fish skin cells. Our current work focuses on three areas: 1) the actin-based motility of intracellular bacterial pathogens such as Listeria monocytogenes, 2) the whole-cell crawling of epithelial cells and leukocytes, and

related processes such as phagocytosis in macrophages, and 3) the dynamics of cellular organization in bacteria and diatoms. A strength of our work is its highly interdisciplinary nature, bridging cell biology, microbiology, and biophysics. By studying diverse questions in diverse biological systems, using both bottom-up approaches (biochemical reconstitution, single-molecule force measurements, mathematical modeling) and top-down approaches (genetic and pharmacological perturbations, quantitative video-based analysis of cell movement, shape, and mechanical coupling), we aim to develop a broad conceptual understanding of the organizational rules that give rise to large-scale cell structure and coordinated movement.

Dr Theriot's Webpage: <https://sites.uw.edu/theriotlab/>



Listeria monocytogenes

TRIBETA TUTORING ONLINE & IN PERSON: Monday - Thursday: starts Mon October 4th

TriBeta Tutoring will be offered Autumn Quarter in-person at the Hitchcock 4th floor study lounge and online over Zoom.


Tutoring starts during the second week of the quarter on October 4th and ends the week before final exams.

Tutors will be present in person (at HCK 4th floor lounge) and over Zoom, Mon-Thurs to answer your questions about BIOL 180/200/220 and GENOME 361. Zoom link and finalized schedule are on our website: <https://sites.google.com/view/uwtribeta/tutoring?authuser=0>

IN-PERSON INSTRUCTIONS: Come to HCK 4th floor study lounge, scan the QR code posted on the wall to log-in. A tutor should be present to assist you!

ONLINE INSTRUCTIONS: Click on the Zoom link on our website to join. When you join, a tutor should be present to assist you. Tutors will have a tutor designation in their Zoom name. If multiple students are present in the meeting, then the tutor might move you into a "breakout" room so that they can assist you more individually or encourage you to work with other students in your class. If no tutors are present in the meeting, then it is likely all tutors have moved into breakout rooms to assist other students. Please wait a few minutes for a tutor to become available.

WE PROVIDE FREE TUTORING FOR INTRODUCTORY BIOLOGY (BIOL 180/200/220) and GENOME 361 students at the University of Washington. Our tutors are undergraduate students at the UW who have excelled in the introductory biology classes and are eager to help other students succeed too. Website of our tutoring page: <https://sites.google.com/view/uwtribeta/tutoring?authuser=0>



TriBeta Tutoring

Prepare for tests

Develop Strong Study Habits

Clarify difficult concepts

Join our community

FREE TUTORING for BIOL 180/200/220 students

Our tutors are students who excelled in this challenging series and are eager to help you succeed!

2021-2022 Executive Board



TriBeta Biological Honor Society

President, MONICA HU

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Vice President, ALLISON DECRACKER

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Vice President, BILL YOUNG

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Our website: <https://sites.google.com/view/uwtribeta/home>

Full Membership is eligible to any student who has completed two Intro Biology courses (180/200) and one additional biology course with a GPA of 3.0 or higher.

WHAT IS TRIBETA?

Beta Beta Beta is a national honor society dedicated to improving the understanding and appreciation of biological studies. It is a platform for students to earn recognition for their efforts and accomplishments while networking with other students and UW Biology staff with the same interests.

In short: a really great organization.

Be on the lookout for TriBeta vents for this coming quarter.



BSE



Greetings from Biology Students For Equity

We are an RSO started about 5 years ago, but never more relevant. “Unprecedented” is overused, but you know now, more than ever, we need community, safe spaces for difficult conversations, and action to help make the department climate kinder and more productive for our BIPOC (black, indigenous, people of color) community members.

We seek to give undergraduates a voice through our collaboration with the Biology department's Diversity and Equity Committee as well as foster community through our undergraduate mentorship program. Our main goals are to discuss, call out, and address inequities in STEM. Follow us on our [Instagram or Facebook Page \(@biologystudentsforequity\)](#) to keep up to date with future events.

If you are interested in joining our email list, becoming a member, or want to learn about how to plug in to our community, please email us at

biologystudentsforequity@gmail.com.

We hope to work with you and for you.

All Humans Are Welcome.

BIO BOOK CLUB: *H is for Hawk* by Helen MacDonald

Get Ready for Bio Book Club! We will choose a fiction or non-fiction book each quarter with a scientific thread, but that also examines social, cultural, and environmental topics. Please feel free to send book recommendations to **Sheryl Medrano** at smedrano@uw.edu.

When Helen Macdonald's father died suddenly on a London street, she was devastated. (Helen Macdonald's father, Alisdair Macdonald, was one of Britain's best photojournalists.) In the grief-filled months that followed she began to dream of hawks.

An experienced falconer—Helen had been captivated by hawks since childhood—she'd never before been tempted to train one of the most vicious predators, the goshawk. But in her grief, she saw that the goshawk's fierce and feral temperament mirrored her own.

Resolving to purchase and raise the deadly creature as a means to cope with her loss, she adopted Mabel, and turned to the guidance of *The Once and Future King* author T.H. White's chronicle *The Goshawk* to begin her challenging endeavor. Projecting herself “in the hawk's wild mind to tame her” tested the limits of Macdonald's humanity and changed her life.



THE SOJOURN IS OVER The Greenhouse Teaching Collection Comes Home

For those of you who don't know, the Biology Greenhouse Teaching Collection has been housed at Amazon's Greenhouse Facility in Redmond while the LSB was being built since 2016. The previous Greenhouse's foot print is where LSB now stands and the plants had to go somewhere. A new 20,000 sq foot Greenhouse was built as part of LSB for the collection & research. We have been waiting a long time for our collection to come home.

Always know you can walk into the greenhouse 365 days of the year and something is blooming in this teaching collection.

The Muhlick Collection

The Biology greenhouse is to be used for both teaching and research. Many of the plants forming the teaching collection were formerly housed in the "old" Parrington Greenhouse which was situated west of Parrington Hall and no longer exists. These plant collections now referred to as the Muhlick Collection were housed in the previous Biology Greenhouse (built in 1949, upgraded in the 1990s and reglazed in 1996).

Clarence V. Muhlick was a Botany instructor who taught horticulture classes and maintained the teaching plant collection in the greenhouse for many years. The collection is now substantially expanded through the efforts of former greenhouse managers, Doug Ewing and Jason Lopez, and the generosity of some donors, especially for the orchid, cactus and succulent collections. And through the generosity of Amazon the last 5 years, the collection has expanded even more.

As of July, Katie Sadler became our new Greenhouse Manager. Katie came from the University of Kansas, where she was Greenhouse Manager for the Department of Ecology & Evolutionary Biology for 29 years.

Our main greenhouse crew is Paul Beeman, Nile Kurashige, Melissa Lacey, Olivia Kaplan and Kaileah Burns who water and care for the plants seven days a week.



Katie Sadler, Kaileah Burns, Olivia Kaplan, Paul Beeman, Nile Kurashige, Melissa Lacey.

THE TEACHING COLLECTION CONTAINS PLANTS WHICH ILLUSTRATE:

TAXONOMIC DIVERSITY OF GREEN PLANTS (MAJOR PLANT GROUPS)

- Non-vascular plants: bryophytes (mosses, liverworts, hornworts)
- Vascular spore plants: ferns, horsetails, club mosses
- Seed plants:
 - Gymnosperms: cycads, conifers, Ginkgo, Welwitschia, Gnetum, Ephedra
 - Angiosperms: monocots, dicots

HABITAT DIVERSITY OF GREEN PLANTS:

- aquatic plants
- wetlands plants
- tropical plants, rain forest plants
- temperate plants
- desert and arid land plants

PLANT ADAPTATIONS:

- for living in water
- for living in trees
- for living in rain forests
- for water conservation in dry habitats
- for very bright and very dark habitats
- for different pollinators
- for nutrient poor bogs (carnivorous plants!)
- for climbing trees: vines

UNUSUAL PLANTS:

- plants with few or no leaves: cacti and plants that look and work like cacti but aren't
- plants with no roots
- plants with ants
- plants with their own swimming pools
- plants that supply useful food, fiber and chemicals
- plants with enticing aromas and plants with foul foetid odors

THE TEACHING COLLECTION Favorite plants in the collection we have missed

As the Greenhouse just got moved by October 5, 2021, they will still be organizing and arranging the plants. It may be several months or so before visitors will be allowed in to check out the display rooms. Volunteers for the Greenhouse will need to wait until winter quarter for more information.

Veronica di Stilio

(Professor)

My all-time favorite is the gymnosperm *Welwitschia mirabilis*, for its sheer weirdness, being the sole species in its lineage, inhabiting the Namibian desert exclusively, growing two leaves for its entire life and becoming enormous, having separate sexes and gorgeous pollination droplets in its female cones.



David Hurley

(IT Director)

I don't have a single favorite but I often would visit the desert room because the shapes of many of those plants were something out of science fiction - wild combinations of terrifying spines or appendages like tentacles but also graceful spirals and delicate flowers. One good example is *Pachypodium lamerei* with huge thorns covering the entire trunk and white fragrant flowers blooming at the top.



Liz Van Volkenburg

(Professor)

My favorite plant is *Monstera* because its sensitivity to the environment is so obvious! Leaves orient toward the light, extra water is guttated out the leaf tips in the morning reminding us of how plants can create positive pressure in the xylem, roots pop out of the stem when the plant is thirsty, and for me at home, these are the most resilient of house plants!



Patti Owens

(Assistant to the Chair)

My favorite plant is *Lycaste aromatica*. The Greenhouse staff would leave a flowering plant for the week at the admin reception desk. It always made me happy to see this cinnamon scented plant. I loved being able to go into the Greenhouse to center myself when life was frantic, it was so calm, warm and misty in there.



Brianna Divine

(Purchasing Manager)

I do like the *Costa barbatas*, it grows so tall and has a beautiful red flower. I hear hummingbirds really like it, but I have not witnessed this.



Jason Patterson

(Academic Counselor Senior)

My favorite plant is *Victoria cruziana*. It used to be in a large pool near the front entrance of the greenhouse. It has a massive monster pad that creates this floating bowl, which is delicate but if the weight/pressure is spread out over the leaf it is strong. It houses a defense network of spines and spikes on its undersides to protect it from herbivores.



Melissa Lacey

(Greenhouse Technician)

My favorite plant is *Magnolia figo*. The reason I like this plant so much is because its yellow flowers that last only a day smell just like bananas!



Jennifer Nemhauser

(Professor)

I would have to say the plant I have missed most is *Synsepalum dulcificum* or Miracle berry. Eating Miracle berries and then having the incredible, even miraculous, experience of eating lemon slices that tasted like lemon candy--this was a regular feature of our graduate student recruitment events and a great community-builder.



THE TEACHING COLLECTION More Favorite Plants

It took 16 truck loads (26' truck bed) with help from faculty, staff, Grad students and undergrads to unload the plants to the rooms. Over 2000 plants in the Biology Teaching collection got moved over from Redmond.

Nile Kurashiga

(Plant Technician II)

My favorite is the *Pachypodium succulentum*, the Desert Rose. This plant stole my heart when I met it in Kenya. Then I saw it here in the teaching collection and got really excited. Every time it blooms it reminds me of our magical trip I had with my family and friends.



Ron Killman

(Scientific Instructional Technician)

My favorite plant is the corpse flower *Amorphophallus titianum*. It is a bizarre plant with an unusually large flower that smells like rotting meat that attracts carrion-eating beetles and flesh flies. Add an intermediate stage of a single gigantic leaf that looks like a tree. How cool is that.



Linda Martin-Morris

(Teaching Professor)

My favorite plant is *Haworthia cooperi*. I fell in love with it when my greenhouse docent told me they like to call it the 'skylight' plant. Its lovely 'windows' combined with its rounded shaped leaves, allows light in, and then the light bounces around inside the 'room'. Lots of energy captured!



Janet Germeraad

(Academic Services Director)

My favorite plant is *Lathyrus odoratus*. OMG! The Sweet Peas! There was always a barrel of blooming sweet peas by the entrance of the greenhouse during summer quarter. You could smell the sweet peas as you walked into the greenhouse. Totally remind me of the love and sweetness of my grandparents! They had sweetpeas in their yard when I visited in the summers.



Gretchen Shirley-Bellande

(Program Coordinator)

My favorite plant is *Nepenthes ephippiata*. This plant is basically Shrew Ex-Lax and is hilariously known as the "Shrew Loo". In order to get nitrogen to supplement where it grows, it creates a great tasting goo on the lid of the pitcher for the shrew to eat. As the shrew eats, the Shrew Ex-Lax goes to work. Due to the location of the goo, the shrew poos into the pitcher, providing the much-needed nitrogen.



Katie Dickinson

(Kerr Lab Manager)

One of my favorite plants is *Ceropegia ampliata*. What is not to like about this succulent vine?! Flowers are large, translucent, white tubes with green stripes, a purple ring, and green pointy "teeth"! Plus, the flowers give off the smell of rotting carrion to get pollinated by flies that it traps.



Julie Martinez

(Program Coordinator)

I really enjoy the Peace Lily, *Spathiphyllum wallisii*. It brings me joy when it flowers as it is a remembrance for me of all those precious people we have lost.



Dick Olmstead

(Professor)

My favorite plant is *Metternichia princeps*. This small tree with showy white flowers is a member of the tomato/potato family, Solanaceae, and is native to the Cerrado region of Brazil, but its closest relatives live in the Greater Antilles and in Madagascar! This plant was grown from material obtained by a student of mine who studied its Antillean relatives for his Ph.D. and is likely the only specimen in cultivation in the United States.



THE TEACHING COLLECTION More Favorite Plants

Teaching Collection is housed in 4 rooms: the Desert Room, Cool Tropics Room, Warm Tropics Room and the Tree of Life room. The rest of the rooms in the Greenhouse are for research.

Mandy Schivell

(Associate Teaching Professor)

My favorite plants were the ***Passiflora***. The greenhouse folks used to grow different species of passion flowers on stakes over a walking ramp next to the old greenhouse. They are AMAZING! These gorgeous bold flowers made me feel like princess as I walked to class underneath their splendor. I hope they will have some prominent place in the new greenhouse!



Davis Chong

(Office Assistant)

My favorite plant is one I actually got from the greenhouse, a false Cardamom plant, ***Alpinia nutans***. I like because it is a tropical perennial herb and smells nice when I have to trim it. The real Cardamom plant does not smell when trimmed.



Jeannette Takashima

(Publications Coordinator)

One of my favorite plants is the Darwin Orchid, ***Angraecum sesquipedale***. Darwin predicted an unknown moth pollinator had a proboscis that was 12+inches long to get the nectar out of its long spurs. This was unheard of. Yet 21 years after Darwin died, they discovered a hawkmoth, ***Morganii preaedicta*** was the pollinator with a proboscis that long. And the orchid blooms at Christmas time.



Sheryl Medrano

(Program Coordinator)

My favorite plant is ***Nymphaea colorata***. They are dainty and delicate yet hardy, refusing with all their might to be pulled out of the soil.



Christine Savolainen

(Biology Intro Series Lab Coord.)

Dionaea muscipula, the Venus Flytrap, is one of my favorite plants. Living in nitrogen poor soils, VTFs flipped the food chain script and prey on animal flesh! Insects are lured to the trap on the basis of food smell mimicry, insects trip the plants' trigger hairs to initiate trap closure and digestion soon follows. 7-10 days later, only the dry husk remains as warning of a sinister danger to other passing creepy crawlies.



Jennifer Ruesink

(Professor)

Lecanopteris mirabilis, the ant fern. A fern, for goodness sakes! ***Lecanopteris mirabilis*** has swollen, hollow stems. Ants live inside (domatia), and they release nutrients (defecation) and CO2 resources that the plant may use, while also attacking herbivores on the plant. So that's the advantage to the plant. The ants get the domatia. Hence mutualism in which both partners of the interaction benefit.



Sarah O'Hara

(Grants Budget Reconciler)

My favorite is the ***Ceratostema rauhii***. If I was reincarnated as a plant, I want to be this plant with its long elegant soft stems and beautiful flowers. When I look at this plant I think of it as the Cousin It of the plant world.



Paul Beeman

(Plant Technician)

My favorite plant is ***Hippeastrum reticulata***. I got it from the Indoor Sun Shoppe. Because the plant is a bulb, it had gone dormant and lost all its leaves. No one would buy it. So I brought it to campus and we have had it 3 years at the old greenhouse and then 5 years out here in Redmond. The plant has never bloomed. It is blooming for the first time right now. It is my current rolling favorite.



THE NEW HEALTH SCIENCES EDUCATION BUILDING

New Health Sciences Education building is currently under construction on Pacific Avenue in the open space adjacent to T Wing, I Wing, J Wing and Hitchcock Hall. The 4 story new building will impact thousands of students across the Schools of Dentistry, Medicine, Nursing, Pharmacy, Public Health, and Social Work. The planned spaces will help facilitate both formal and informal inter-professional activities with a variety of classroom sizes, student study areas, library functions, and a new anatomy lab. The project is built on some of the following goals:

- Create a student hub for the health science schools that fosters interaction, collaboration, and creativity.
- Build a centrally located Health Sciences Education Building utilizing the unique adjacencies of research, academic, and clinical programs to train future health professionals in support of affordable, accessible, and high quality 21st century health care.
- Create a building with flexible spaces, modern technologies, and a broad array of environments that adapt to the changing pedagogical needs of the health sciences and enable active and team-based learning.



Jason Patterson in October 2021



Jason Patterson in September 2021



Jason Patterson in Autumn 2021



Jason Patterson in Summer 2021



Jason Patterson in Spring 2021



Jason Patterson in March 2021



Jason Patterson the end of December 2020 before Winter quarter started.



Ron Killman the end of September 2020 before Autumn quarter started.