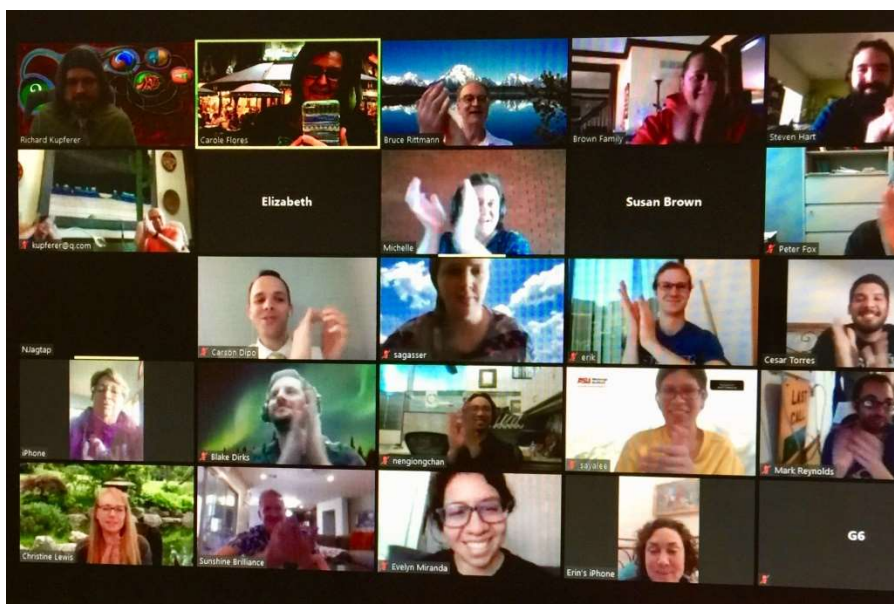




Impact Report

Biodesign Swette Center for Environmental Biotechnology



January – December 2020
Strategic Investment - Annual Impact Report





By using the building blocks of Nature's grand designs, our talented researchers have pushed the frontiers of knowledge and advanced research and discovery to make a **major impact** on our community, nation, and world.

Despite the many difficulties posed by Covid-19, the members of BSCEB were productive and mutually supportive in 2020.

This Impact Report documents that many activities and achievements within BSCEB for 2020: e.g., features about our people and activities, awards received, degrees granted, papers published, grants awarded, and service rendered.

The report highlights key advances that are paving the way for greater discoveries in the future.

We are most grateful for the generous support and confidence that the Swette family has provided. Without that help, these achievements would not have occurred.

The Swette Strategic Investment Fund has advanced our ability to create new solutions to improve the sustainability of society

The Swette Strategic Investment Fund has supported the Biodesign Swette Center for Environmental Biotechnology (Swette Center) as its researchers develop preliminary results, publish seminal papers, give talks across the world to enthusiastic audiences, and have time to seek funding for new projects. We have been fortunate in our ability to attract outstanding researchers and integrate them effectively into our team and our work. Their talents and inspiration are ongoing sources of ideas making new discoveries.

The Swette funds have been the fuel that has enabled us to take giant leaps in our search for solutions that will help the world create a more sustainable environment. Here are a few examples of projects that have gained traction due to the Swette funds:

Swette investments were made towards exploring and understanding the human intestinal microbiome. This resulted in a ground-breaking publication on the long-term benefits of microbiota transplant therapy for improving behaviors of children in the autism spectrum and understanding obesity. It also led to the “spin out” of the Biodesign Center for Health Through Microbiomes.

We invested in our microbial photobioenergy team, which led to a ~\$2-million grant from the Department of Energy to expand membrane carbonation for delivering industrial sources of CO₂ to enable high productivity with microalgae cultivation.

The Swette investment allowed us to extend our work with membrane-film reactors to bioremediate waters contaminated with two challenging water contaminants: 1,4-dioxane and per-fluorinated alkanolic substances. The Center also is focusing on using membrane-film reactors to recover valuable metals from mining, ore-processing, and recycling wastewaters.

OUR MISSION

The mission of the Biodesign Swette Center for Environmental Biotechnology is to manage microbial communities that provide services to society. Many of the services make our society more environmentally sustainable, for example, generating renewable resources and making polluted water and soil clean.

The microbial services also make humans healthier – directly and indirectly.

The Swette Center is noted for its culture of cross-disciplinary and team-based research. This culture begins with our researchers who come from diverse disciplines within engineering, life sciences, chemistry, and more.

The Center embraces systems thinking, sustainable engineering, and disruptive innovation. Partnerships are common within the different research groups in the Swette Center, other groups in ASU, national and international universities, and practitioners.



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FEATURES

Dr. Rosa Krajmalnik-Brown Launches the New Biodesign Center for Health Through Microbiomes

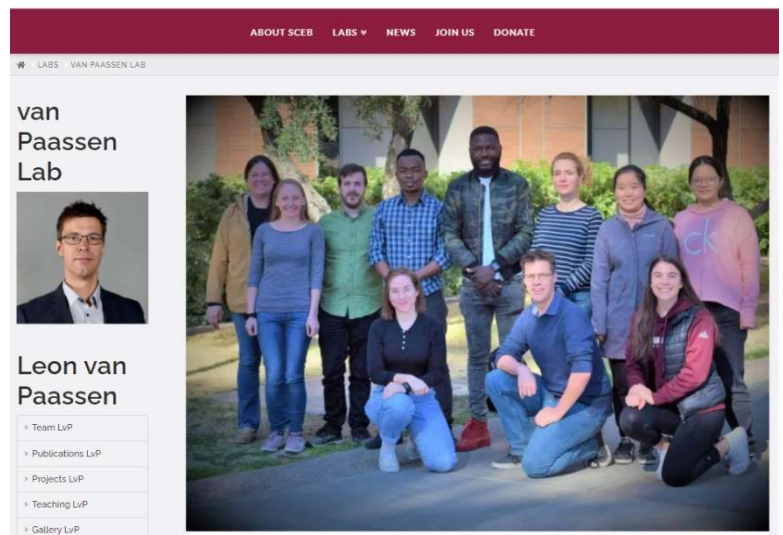
In August 2020, [Dr. Rosa Krajmalnik-Brown](#) launched the Biodesign Center for Health through Microbiomes (BCHTM). Dr. Rosy, who was one of the first members of the Biodesign Swette Center for Environmental Biotechnology (BSCEB) in 2005, most recently was a professor in BSCEB. BCHTM is the second "spin out" center originating from EB; Dr. Rolf Halden spun out the Biodesign Center for Public Health Engineering in 2012. BCHTM will capitalize on its ability to manage the human microbiome to have a positive, transformational effect on human health. Biodesign CEO Joshua LaBaer announced BCHTM in a press release that is featured [HERE](#).

Leon Van Paassen Joins BSCEB.

Leon, an assistant professor in the School of Sustainable Engineering and the Built Environment, has more than 15 years research experience and expertise in the biological, chemical, and physical characterization of soils, biochemical reactive transport and multiphase flow in porous media. Past and current research projects include bio-based ground improvement through microbially induced carbonate precipitation, liquefaction mitigation through desaturation by stimulating nitrate-reducing bacteria to produce nitrogen gas, using bio mineralization for dust suppression, bio-mediated iron precipitation for permeability reduction and bio-inspired scour protection for submerged foundation systems. Leon was recruited to ASU to be a faculty member in the NSF-sponsored Center for Bio-inspired and Bio-mediated Geotechnics (CBBG). Leon joined BSCEB to enhance his cross-disciplinary work that links geotechnics with microbiology.

Christopher Muse, Instrument Technician, joined the Center in December of 2020. He brings 30 years of expertise in maintaining analytical equipment and performing toxicology studies.

Paul Brewer, Postdoctoral Research Scientist, joined the Cadillo-Quiroz Lab in January of 2020 to work on the Salt River Landfill Fugitive Gases and Amazon Peatland Projects. He joined us from Colorado State University, where he received his PhD in Ecology.



Aide Robles Wins First Place in Geosyntec 2020 Groundwater Student Paper Competition

Aide Robles has won the 11th Annual Geosyntec Student Paper Competition! She is a PhD student here at Arizona State, her advisor is Anca Delgado. You can check out the [call for submission web page](#), which shows the details of the competition. Read the full article [HERE](#). We are proud of Aide and all of her hard work!



Robles (Advisor: Delgado) Wins First Prize in 11th Geosyntec Student Paper Competition

BSCEB Spring 2020 Graduates Honored

The [School of Sustainable Engineering and the Built Environment newsletter](#) for the month of May highlights Spring 2020 graduates who are part of BSCEB. We congratulate them and wish them the best of luck to in all of their future endeavors.

Kyle Reep is a part of the Rittmann team in EB.

Brielle Januszewski was part of the Rittmann team and is now a PhD student at Yale U. Also, the newsletter, under "Student Accomplishments", tells about **Aide Robles** (Delgado Lab) and how she won first place in the "11th Geosyntec Student Paper Competition."

Microbial Chain Elongation Drives Complete Reductive Dechlorination of Trichloroethene



Aide Robles

Ph.D. student in Environmental, Arizona State University (ASU), Biodesign Swette Center for Environmental Biotechnology and School of Sustainable Engineering and the Built Environment
Faculty advisor: Anca G. Delgado

arobles9@asu.edu

Master's in Environmental Engineering from ASU, Bachelors of Science in Civil Engineering and Bachelors of Arts in Modern Languages - Spanish from Northern Arizona University

Meet Our Outstanding Spring 2020 Graduates



Macy Canete ,
Construction Management
and Technology



Ashley Colaizzi ,
Construction Engineering



Brielle Januszewski ,
Civil Engineering



Kyle Reep ,
Environmental Engineering

Rittmann and Center Recognized as ASU Lab Safety Innovators

In the February 18, 2020 issue of [ASU Now: Access, Excellence, Impact](#), **Bruce Rittmann** and his Center team were commended for their efforts for increasing mindfulness and training around the use of sharps in the lab, with a special focus on preventing needle sticks. This effort was spearheaded by **Sarah Arrowsmith**. [FULL ARTICLE](#)

Moni Miranda Wins Biodesign Travel Grant...You Can Too!

In February, Evelyn “Moni” Miranda received the [Biodesign Travel Grant](#) for a total of \$500! This grant was to be used towards her expenses for Battelle’s Twelfth International Conference on Remediation of Chlorinated and Recalcitrant Compounds in Portland, Oregon from May 31st– June 4th, 2020. She was meant to present on her work featuring sulfate-reducing bioreactors for the treatment of acid mine drainage. However, the conference was postponed due to COVID.



Rittmann and Center Recognized as ASU Lab Safety Innovators

In the February 18, 2020 issue of [ASU Now: Access, Excellence, Impact](#), Bruce Rittmann and his Center team were commended for their efforts for increasing mindfulness and training around the use of sharps in the lab, with a special focus on preventing needle sticks. This effort was spearheaded by Sarah Arrowsmith. [FULL ARTICLE](#)

“Microbial Remedies Target Chemical Threats in the Environment” Widely Acclaimed

[Anca Delgado](#), [Rosa Krajmalnik-Brown](#), and [Srivatsan Mohana Rangan](#) were featured in a recent issue of *Environmental Science and Technology*. Their study revealed novel ways to remove very toxic chemicals from our environment. You can check out the description of this study on the [ASU Biodesign Institute site](#) or also the full text [HERE!](#) They also received wide coverage in the [AAAS newsletter](#), [Science Daily](#), [Bioengineering.org](#), [Science Magazine](#), [Phys.org News](#), and [News-Medical](#).



Krajmalnik-Brown Team Research Reported in Nature Article



Results from a child study are reported in the January 29, 2020 issue of *Nature*. Researchers in the [Krajmalnik-Brown Lab](#) found that children with autism spectrum disorder had lower gut microbe diversity, especially lower numbers of *Bifidobacteria* and *Prevotella*. After an 18-week study during which participants received a bacteria-fortified drink, the children’s gastrointestinal symptoms of chronic diarrhea, pain and constipation reduced by 80% and their gut bacterial diversity increased. Read the article [here](#).

Davis’ Research Links Disparate Fields to Promote Innovation

Taylor Davis’s article got a special coverage from [Dr. Elizabeth Edwards from U Toronto in Journal of Nutrition](#). Her model brings together research in human nutrition and environmental biotechnology.

In this issue of the *Journal of Nutrition*, Davis et al. (3) have examined the relationship between E_g and COD for a wide variety of food types to bring the two fields of study closer and enable cross-pollination of ideas. Fortunately for all, the relationship is robust and readily deployed. I encourage you to read their article.



The article titled “Long-Term Continuous Co-reduction of 1,1,1-Trichloroethane and Trichloroethene over Palladium Nanoparticles Spontaneously Deposited on H₂-Transfer Membranes” was published in *Environmental Science & Technology* and was selected for supplementary-information cover art and will be featured in an upcoming volume. This was an effort of the Rittmann and Zhou labs.”



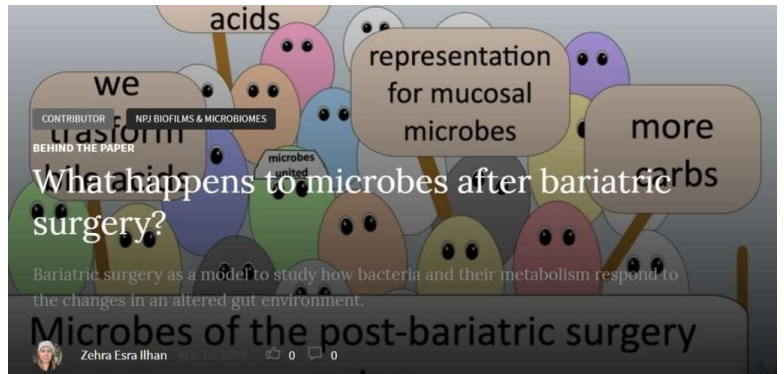
Rittmann Lab MBfR Research Featured in ASME News

Kelly, Caitlin (2020, 4 28) "[Engineers Tackle Water Shortages](#)". Rittmann's team uses biofilms—colonies of mixed bacteria that grow on surfaces and often cause fouling—to remediate contaminated waters. "What we're working on now is mining wastes and toxic wastes, looking at valuable extractions that get precipitated into solids like silver, gold, palladium, and platinum, which are super high value," he said. "We can get a lot of value from the things we recover, but we have to find markets for them and then we're competing against established [vendors]."



Ilhan and Krajmalnik-Brown Publish in Nature Biofilms and Microbiomes

Nature Partner Journals released an open article, "[Temporospatial shifts in the human gut microbiome and metabolome after gastric bypass surgery](#)," by [Zehra Esra Ilhan](#), [Rosa Krajmalnik-Brown](#) and a collection of esteemed collaborators from BSCEB and elsewhere on March 13, 2020. This work, featured in [NPF Biofilms and Microbiomes](#), describes how gastric bypass surgery affects mucosal and fecal microbiomes and fecal fermentation and bile acid metabolism.



Biodesign Research Implemented at Precient Technologies

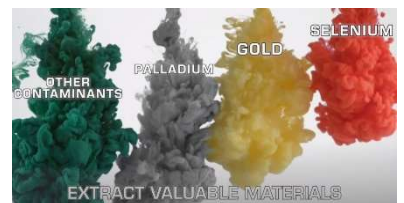
The Rittmann and Zhou Labs, within BSCEB, are focusing on removing wasteful substances and metals from contaminated water. This remarkable research is being implemented at the spin-off company, [Precient Technologies](#). You can view a video about how Precient Technologies is implementing BSCEB's research [HERE](#). BSCEB continues to research these methods in an effort to keep learning and improving water treatment technologies in partnership with microbes!



Graduates Share Knowledge, Tricks, Secrets

Bless Your Heart! Navigate your graduate program with these tips...

Dr. Michelle Young shares tips, hacks, and insights learned over the course of her PhD career. This is a **MUST WATCH** for all graduate students on their journeys toward a higher degree in Environmental Engineering, Chemical Engineering, Biological Design, Microbiology, or other programs to which students within BSCEB belong. She has learned from her own successes and mistakes, watched others and wished she had done what they had to work smarter. She addresses the shocks she experienced when getting feedback about her work and highlights tools that ASU provides for your success. Watch her presentation [HERE](#).



Heartfelt Shenanigans

Dr. Neng long shared creative tricks he discovered throughout his PhD journey, including the things he did well, and things he wishes he'd done better in terms of funding, writing, and career planning. He urged us to listen to our heart and search for opportunities that match our dreams, network, and cultivate good storytelling. Read the blog [HERE](#).



“My Career Earthquake”

Caitlyn Hall published an article on the website “[Science](#)”, that talks about her research on earthquake hazard mitigation technology. She was so excited and motivated because she knew her research could save tons of lives and also an immense amount of money. Her excitement halted when she received discouraging feedback from a sponsor. In her article, Caitlyn describes that common fears and challenges that students face in successfully navigating graduate school and how her career path took a unique turn toward policy.



Surviving While in Isolation, A Working Parent’s Perspective

Lab Coordinator and Safety Compliance Officer Sarah Arrowsmith demonstrates how much COVID has disrupted the life of her family and provides insight into how she maintains her job and children’s education and care while her EMT husband is called away by FEMA to help at the front-line of health care and mitigation. Read article [HERE](#).



Swette Center Culture: Moving Toward Intentional, Consistent Reflection and Action

BSCEB’s leadership team always has been supportive of culture-building activities, such as off-campus outings, on-campus celebrations, t-shirt contests, brainstorming sessions and much more. They recently began searching for a way to regularly assess Center culture. They set Laboratory Coordinator **Sarah Arrowsmith** and Business Operations Manager **Carole Flores** on a mission to find validated instruments. We found two; one quantitative and one qualitative. The quantitative tool is the Gallup Q12 Employee Engagement Survey which has been adopted by the ASU Knowledge Enterprise, which is the research umbrella under which the Biodesign institute falls. The qualitative tool is the ASU Culture Ripples Appreciative Interview. Our Center participated in the latter in June 2020, led by Flores. Deployment of the former has been delayed due to COVID. We are eager to compile our interview feedback and make meaning out of our results.



Appreciative Interviews (AI). Discovering and Building on the Root Causes of Success. “You can liberate spontaneous momentum and insights for positive change from within the organization as ‘**hidden success stories are revealed**’. Positive movement is sparked by the search for what works now and by uncovering the root causes that make success possible. Groups are energized while **sharing their success stories** instead of the usual depressing talk about problems. Stories from the field offer social proof of local solutions, promising prototypes, and spread innovations while providing data for **recognizing success patterns**. You can overcome the tendency of organizations to underinvest in social supports that generate success while overemphasizing financial support, time, and technical assistance.”



Figure 1 <http://www.liberatingstructures.com/5-appreciative-interviews-ai/>

Delgado Lab teaches public about Clean Up Bugs at ASU Open Door on 2/22/20

On Saturday February, 22 of 2020, the Biodesign Institute participated in the annual [ASU Open Door](#) event to allow our public partners to better understand the scientific pursuits of the Biodesign Center. This event had many booths and interactive displays from the various labs and institutes that comprise the Biodesign Institute. The [Swette Center for Environmental Biotechnology](#) presented various learning experiences by the members of Drs. Rittmann, Torres, Krajmalnik-Brown and [Delgado](#) laboratories. Pictured here, the Delgado laboratory was represented by Evelyn Miranda, and Skanda Vishnu with help from our [EHE friends](#), Ashley Heida and Sayalee Joshi, who presented a display which allowed participants to more fully understand soil microbes and their ability to degrade contaminants.



BSCEB Engages Artist and Engineer Rick Kupferer to create Science Communication Kits

Rick Kupferer received his M.S. in Environmental Engineering based on work that he did in the Rittmann Lab. Rick is also an accomplished artist ([website](#)). Soon after he graduated, Dr. Rittmann engaged him to work with Center members to develop outreach kits for use at various campus and community events to share what we do and inspire others. Rick developed We've Got Your Bac (Krajmalnik-Brown Lab), Supercrobes (Delgado Lab), Hidden Helpers (Torres Lab), and Microbial Transformations (Rittmann Lab & Zhou Labs). We look forward to being able to share them!



Dr. Rosy Discusses Autism Microbiome Research with Public at Sip of Science Event

On Tuesday, February 4, 2020, [Dr. Rosy](#) presented "Linking Autism and the Microbiome" at Blanco Tacos & Tequila at Biltmore Fashion Square as part of the Biodesign [Sip of Science](#) lecture series.

Can healthy gut bacteria help children with autism? Not everyone hosts the healthy gut microbes which affect brain communication and neurological health. Dr. Rosy described her research that explores transferring healthy intestinal bacteria to heal the gut in hopes of improving autism-related behaviors and relieving common GI problems associate with autism.



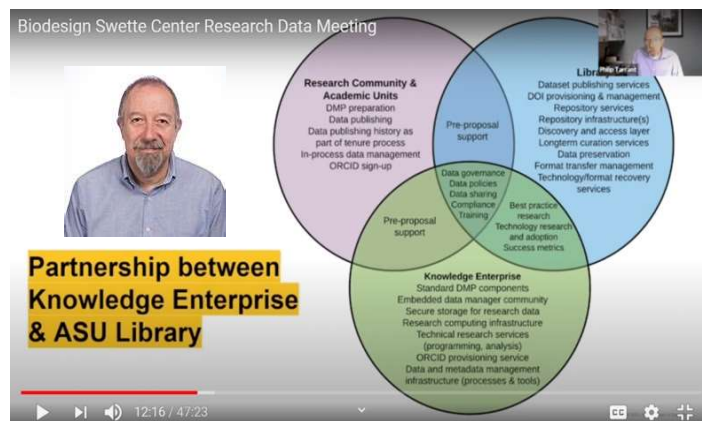
Rittmann Organizes Biodesign Chalk Talks

Bruce Rittmann leads a committee of four members, including Matthew Scotch, Debra Hansen, Ramon Velazquez and Merielle Kalos. The committee organizes the Biodesign Chalk Talks, which have two purposes. One is to make it easy for Biodesign faculty to learn about their colleagues and the colleagues' research. Biodesign is very diverse, and we need to enable cross-center and cross-disciplinary communication. The Chalk Talks are key to achieving that goal. Two is to facilitate new collaborations by exposing faculty to what their colleagues do. You can find the full chalk talk story [HERE!](#)



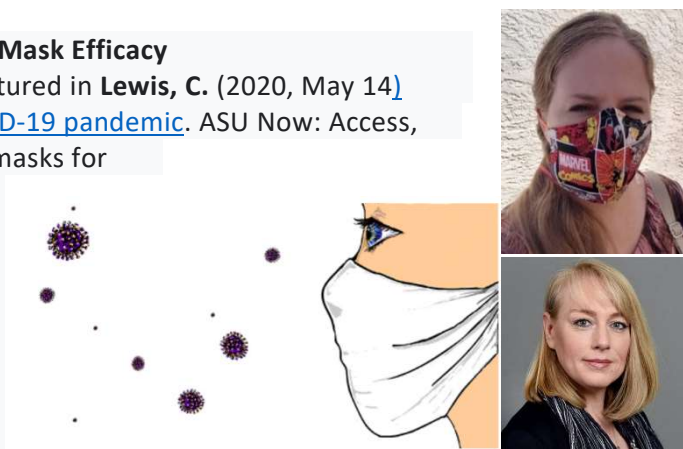
KE Provides Data Management Support for ASU Researchers

During our 11/18/20 Whole Center Meeting, Philip Tarrant, Research Data Management Officer and Senior Sustainability Scientist for Knowledge Enterprise, presented about the data management options available to us throughout ASU and helped us start to think through how they might apply to our work. He included topics such as research computing, electronic lab notebooks, ORCID, library research data services, and institutional repositories. [HERE](#) is his Zoom presentation. *Most funding agencies and many journals now expect research data to be made publicly accessible as part of a grant. Knowledge Enterprise and the ASU Library have partnered to provide the tools, technology, and services to help our research community meet this requirement. This overview will outline the support you can draw upon as you conduct your research.* This information and more is available online with the [GRASP 2020 conference presentations](#) (Grants Research and Sponsored Projects). BSCEB is grateful to Phil for taking the time to bring us up-to-date on ASU's efforts to bring many resources online in the near future!



Arrowsmith Masks Arizona and Lewis Reports about Mask Efficacy

Sarah Arrowsmith, our Laboratory Coordinator, is featured in **Lewis, C. (2020, May 14)** [Cloth masks a worthy line of defense to mitigate COVID-19 pandemic](#). ASU Now: Access, Excellence, Impact. Not only did she make re-usable masks for front-line workers when they were in short supply at the beginning of the pandemic, but her masks were tested for efficacy by Pierre Herckes in the ASU School of Molecular Sciences, and they proved to do much better than most homemade masks, catching approximately 95%-99% of particles that ranged in size between 0.07 and 0.209 microns.



BSCEB Donates Food to Pitchfork Pantry

Our Center members were looking for a way to volunteer during the holiday season. We collected food to donate to the ASU Pitchfork Pantry throughout December of 2020. "The Pitchfork Pantry is a student-run food pantry that serves ALL ASU students. The Pitchfork Pantry serves to fight food insecurity and promote well-being, sustainability and food recovery. We provide packages containing a variety of non-perishable foods and toiletries." [LINK TO WEBSITE](#)

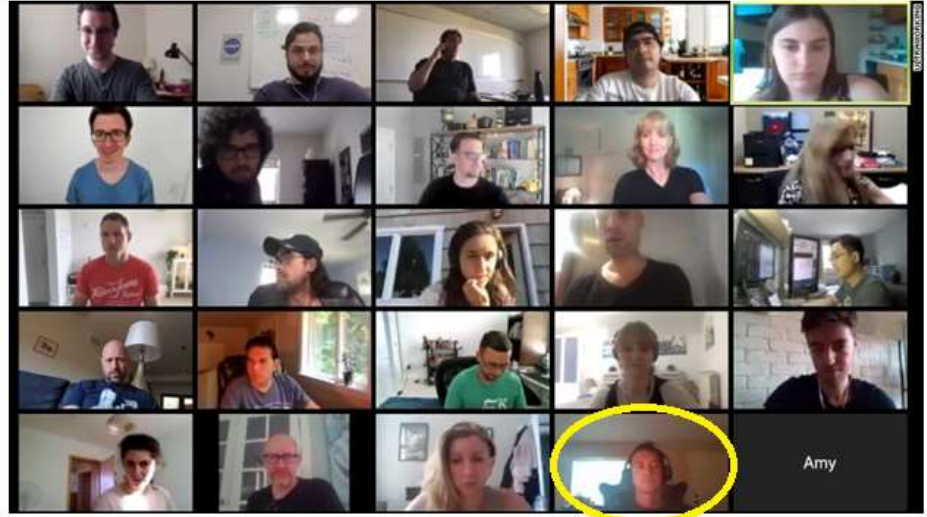


Calvo Helps Coworkers through Pandemic Challenges

Diana Calvo Martinez shared advice about how to deal with "research guilt" during a pandemic. Read the blog [HERE](#).



BSCEB Members Enjoy Ultraworking and Featured on CNN
Andrew Marcus and Diana Calvo-Martinez were featured on CNN (Oct 20, 2020) in [Struggling to work productively from home? Let strangers watch you. Let strangers watch you.](#) They describe how they and others in BSCEB have been using [Ultraworking](#) work cycles for improving research productivity.



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STATS and MEMBERSHIP

	2020
Peer-Review Articles	71
Presentations	78
Patent Disclosures	7
Patent Licenses	1
PhDs Degrees	3
Master's Degrees	4
Bachelor's Degrees	7
# of Mentors	24
Visiting Scholars	4*
countries	3
continents	2
High School Interns	0
Teacher Interns	0
Volunteers	0
Staff	7
Undergraduates	28
FURI & SOLUR	0
Swette	1
4+1	3
PhD & Masters	41
Dean's Scholars	5
Postdocs	5
Research Scientists	4
Research Professors	2
Academic Faculty	7
Outreach Activities	35
Awards	19
individuals	15
competitions	3
travel grants	1
Promotions	2
Funded Projects	31

*reduced due to COVID-19

MEMBERSHIP

First	Last	Lab (Direct Mentor)	Position
Sarah	Arrowsmith	All	Lab Coordinator
Carole	Flores	All	Business Operations Manager
Andrew	Marcus	All	Asst Research Professor
Chris	Muse	All	Instrument Technician
Rob	Stirling	All	Techno-Economic Analyst
Treavor	Boyer	Boyer	Academic Faculty - Professor
Michael	Edgar	Boyer	PhD Student
Carlos	Leyva	Boyer	Engineer
Hannah	Ray	Boyer	PhD Student
Rain	Richard	Boyer	PhD Student
Daniella	Saetta	Boyer	PhD Student
Lucas	Crane	Boyer (Rain)	Undergraduate Volunteer
Rebecca	Dietz	Boyer (Rain)	PhD Student
Michele	Giulietti	Boyer (Hannah)	Undergraduate Volunteer
Jillian	Ayers	Cadillo	4+1 Masters Student
Paul	Brewer	Cadillo	Postdoctoral Researcher
Hinsby	Cadillo Quiroz	Cadillo	Academic Faculty - Professor
Camila	Delgado-Montes	Cadillo	PhD Student
Kari	Gallego Bravo	Cadillo	Visiting Scholar
Michael	Pavia	Cadillo	PhD student
Analissa	Sarno	Cadillo	PhD Student
Elias	Rodriguez	Cadillo (Analissa)	Undergraduate Volunteer
Julian	Yu	Cadillo (Analissa)	PhD Student
Marc	Fontanez Ortiz	Cadillo Quiroz	Masters Student
Mark	Reynolds	Cadillo, Krajmalnik-Brown	PhD Student
Anca	Delgado	Delgado	Academic Faculty - Assistant Professor
Evelyn	Miranda	Delgado	PhD Student
Aide	Robles	Delgado	PhD Student
Skanda	Vishnu Sundar	Delgado	Research Technician
Lindsey	Bastian	Delgado (Justin)	Undergraduate Volunteer
Alia	Raderstorf	Delgado (Aide and Justin)	Undergraduate Volunteer
Colton	Landrum	Delgado (Aide)	Undergraduate Volunteer
Maxwell	Silverman	Delgado (Aide)	Undergraduate Volunteer
Justin	Skinner	Delgado (Aide)	PhD Student
Alison	Nitzky	Delgado (Skanda)	Undergraduate Volunteer
Jacob	Plummer	Delgado (Skanda)	Undergraduate Volunteer

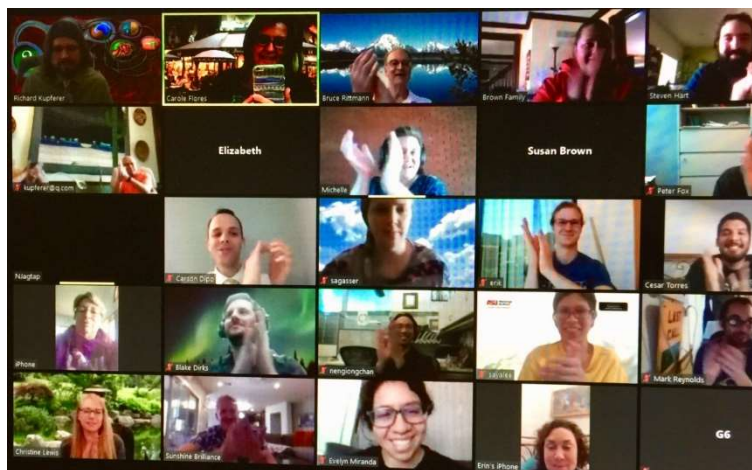
Srivatsan	Mohana Rangan	Delgado, Krajmalnik-Brown	PhD Student
Anisha	Agarwal	Krajmalnik-Brown (Khem)	Undergraduate Volunteer
Blake	Dirks	Krajmalnik-Brown	PhD Student
Rachel	Klein	Krajmalnik-Brown (Lydia, Alana)	Undergraduate Volunteer
Rosy	Krajmalnik-Brown	Krajmalnik-Brown	Academic Faculty - Professor
Khemplal	Nirmalkar	Krajmalnik-Brown	Postdoctoral Research Scholar
Lydia	Zeibich	Krajmalnik-Brown	Postdoctoral Research Scholar
Alana	Florea	Krajmalnik-Brown	PhD Student & Dean's Fellow
Marissa	Bennett	Krajmalnik-Brown (Khem)	Undergraduate Volunteer
Mira	Marwah	Krajmalnik-Brown (Khemplal)	Undergraduate Volunteer
Erik	Barraza Cordova	Krajmalnik-Brown (Sri)	Undergraduate Volunteer
Xan	McMacken	Krajmalnik-Brown (Sri)	Undergraduate Volunteer
Taylor	Davis	Krajmalnik, Marcus, Rittmann	PhD Student & Dean's Fellow
Joshua	Boltz	Rittmann	Research Engineer
Everett	Eustance	Rittmann	Postdoc, Ast Research Scientist
Ye	Ji	Rittmann	Visiting Scholar
Rick	Kupferer	Rittmann	Masters Student
Yen-Jung	Lai	Rittmann	Ast Research Scientist
Yihao	Luo	Rittmann	PhD Student
Bruce	Rittmann	Rittmann	Center Director, Regents Professor, Academic Faculty
Thiago	Stangherlin-Barbosa	Rittmann	PhD Student
Burcu	Yavuz	Rittmann	PhD Student
Michelle	Young	Rittmann	Postdoctoral Research Fellow, Ast Research Scientist
Chen	Zhou	Rittmann	Ast. Research Scientist, Ast. Research Professor
Abdilwahab	Eidi	Rittmann (Anwar)	Masters student
Gloria Appiah	Nsiah	Rittmann (Anwar)	4+1 Masters Student
Caitlyn	Hall	Rittmann	PhD Student
Anwar	Alsanea	Rittmann (Chen)	PhD student, Graduate Research Ast.
Min	Long	Rittmann (Chen)	Visiting Scholar
Kyle	Reep	Rittmann (Chen)	PhD Student & Dean's Fellow
Yuhang	Cai (call him CHAI)	Rittmann (Chen, Josh)	Visiting Scholar
Zoe	Frias	Rittmann (Everett)	Student Worker IV
Hannah	Molitor	Rittmann (Everett, Sean)	Visiting Scholar

Brian	Roman	Rittmann (Josh)	MS Student
Chung-Seop	Lee	Rittmann (Juliana, Westerhoff)	Postdoc (Westerhoff Lab)
Josh	Atwater	Rittmann (Michelle)	Undergraduate Volunteer
Claire	Pishko	Rittmann (Michelle)	Undergraduate Volunteer
Smith	Pittman	Rittmann (Michelle)	Undergraduate Volunteer
Austin	Baker	Rittmann (Michelle/Rick)	Undergraduate Volunteer
Abigail	Johnson	Rittmann (Rick)	Undergraduate Volunteer
Emma	Nelson	Rittmann (Sarah)	Undergraduate Student Worker
Neng long	Chan	Rittmann (Sean)	PhD Student
Chenwei	Zheng	Rittmann (Sean)	PhD Student
Matthew	Scholz	Rittmann, Elser	Project Manager
Isaias (Isa)	Peraza	Rittmann, Marcus, Torres	PhD student, Conacyt Fellow
Diana	Calvo Martinez	Rittmann, Torres, Marcus	PhD Student
Xiangxing	Long	Rittmann, Westerhoff	PhD Student
Juliana	Levi	Rittmann, Westerhoff (Chen)	PhD Student
Ben	Agbo	Torres	Masters student
Megan	Altizer	Torres	PhD Student
Kaitlyn	Alvarez	Torres (Steve and Megan)	Undergraduate Volunteer
Steven	Hart	Torres	PhD Student
Ethan	Howley	Torres	PhD Student, Dean's Fellow
Zachary	Hubbard	Torres	PhD Student, CBBG
Sahil	Kanawade	Torres	Masters student (paid)
Andrea	Russell	Torres	4+1 Student
César	Torres	Torres	Academic Faculty - Assoc Professor
David	Aviles	Torres (Ben)	Undergraduate Volunteer
Anna	Mangus	Torres (Christine)	Undergraduate Volunteer
Naeem	Ali	Torres (Ethan, Michelle)	Visiting Scholar
Kaitlyn	Alvarez	Torres (Megan, Steven)	Undergraduate Volunteer
Isabel	Angulo Lopez	Torres (Naeem, Michelle)	Undergraduate Volunteer
Ethan	Howley	Torres and Krajmalnik-Brown	PhD Student & Dean's Fellow
Merielle	Kalos	Torres and Krajmalnik-Brown	Administrative Asst (RKB & CIT)
Christine	Lewis	Torres, Fromme	PhD Student
Hamed	Khodadaditirkol aei	Van Paassen Lab	Postdoctoral Researcher
Leon	van Paassen	Van Paassen Lab	Academic Faculty - Assistant Professor

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GRADUATES

1. Appiah Nsiah G (2020 08 20) BSc., Civil Engineering, Kwame Nkrumah University of Science and Technology, 2020 08 20. (Rittmann Lab)
2. Ayers, Jillian (2020 May 11). B.S., Microbiology, School of Life Sciences. (Cadillo Lab)
3. Bourquin, B (2020 May) B.S., Neurobiology, Physiology, and Behavior, School of Life Sciences, Evaluating the consumption rates and methane production of primary vs secondary fermentation substrates of Northern Peatlands across a climate gradient, May 2020. (Cadillo Lab)
4. Buessecker, S (2020 March) Ph.D., Environmental Life Sciences, School of Life Sciences, Coupled Abiotic and Biotic Cycling of Nitrous Oxide. (Cadillo Lab)
5. Chan, N.I. (2020 August 11) PhD, Environmental Life Sciences, School of Life Sciences, Dimensions of Phosphorus Sustainability: Phosphorus Flows in a Rapidly Growing City and Field Tests of Potential Agricultural Prototypes (2020 August 11). (Rittmann Lab)
6. Coppinger, Kristina (B.S.) Microbially Induced Desaturation and Precipitation by denitrification for mitigation of earthquake induced liquefaction (Honors thesis) Spring 2020. (Van Paassen Lab)
7. Januszewski, B. (2020 May 06). Bachelor of Science, ASU, Barrett Honors College, Thesis: Risk Assessment and Toxicity to Terrestrial Plants of Soil Contaminated by Heavy Hydrocarbons and Treated with Ozone. (Rittmann Lab)
8. Kupferer III, R. (2020 June 30). M.S. Environmental Engineering, Characterization of Souring in Anaerobic Co-digestion Reactors Loaded with Thickened Sludge, Food Waste, and Fats, Oils and Grease Waste. (2020 June 30). (Rittmann Lab)
9. Landrum, Colton (2020 May 11). Bachelors of Science, Biological Sciences, School of Life Sciences, (2020 May 11). (Delgado Lab)
10. Ramirez, Joel (M.S.) no thesis, Spring 2020. (Van Paassen Lab)
11. Ray, Hannah, Ph.D., Civil, Environmental and Sustainable Engineering, School of Sustainable Engineering and the Built Environment, Nitrogen Recovery from Human Urine by Membrane Processes, December 2020
12. Reep, J. (2020, May 8) B.S.
13. Sebastiao, Belchor (M.S.) no thesis, Summer 2020. (Van Paassen Lab)
14. Sundar, Skanda Vishnu (2020, Aug). M.S. Civil, Environmental and Sustainable Engineering, School of Sustainable Engineering and the Built Environment, Ira A. Fulton Schools of Engineering, Thesis: Quantification of Soil Organic Matter as Total Petroleum Hydrocarbons by GC-FID in Non-Contaminated Soils.
15. Yu, Julian (2020 Dec 30) Ph.D. Microbiology, School of Life Science, Characterization of Tropical Agricultural Soil Microbiomes After Biochar Amendment. May 2020. (Cadillo Lab)



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JOB PLACEMENTS

1. Awasthi, V. Engineer consultant. Wilson Engineers.
2. Arafa, O. Chemical Engineer. Intel.

3. Buessecker, S. (2020 March), Postdoctoral Research Scientist, Earth Systems Science, Dekas Lab, Stanford University.
4. Chan, N.I. (2020 Nov 15) Associate Dean of Math and Science Development, Iris University, 2020 Nov 15.
5. Kupferer, R (2021 01 05) Engineer-in-Training, Stanley Consultants, 2021 01 05).
6. Sundar, Skanda Vishnu (2020, Dec). Research Technician, Biodesign Swette Center for Environmental Biotechnology, Arizona State University.
7. Yu, J (2020 Dec 30). Postdoctoral Researcher, ASU Biodesign Center for Fundamental and Applied Microbiomics, Sept 2020 Yu, J (2020 Dec 30). Microbiome Scientist, Heliae Development, January 2021.

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VISITING SCHOLARS

1. Naeem Ali, Professor, Visiting Scientist, Fulbright Scholar, Advancement in Microbial Fuel Cell Technology Coupling Wastewater Treatment to Electricity Production, Cesar Torres, (January 16, 2020 - January 10, 2021). Quaid-i-Azam University, Islamabad, Pakistan
2. Yuhang Cai, Biodesign Swette Center for Environmental Biotechnology, AnBfMBR, Dr. Boltz and Dr. Rittmann, 10/04/19-03/28/21. Harbin Engineering University, Harbin, China
3. Aixa Kari Gallego Bravo, Exchange scholar, SOLS, Bioenergy generation from domestic waste, Hinsby Cadillo-Quiroz, August 2020 - August 2021. Instituto Politécnico Nacional, Mexico City, Mexico
4. Ye Ji, Visiting PhD Student, Food waste co-digestion model based on CASADM, Bruce Rittmann and Michelle Young mentors, October 2019 – October 2020. Harbin Institute of Technology, Harbin, China

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AWARDS AND PROMOTIONS

1. Angulo, I. (2020 May 20). Changemaker Challenge Grant, Changemaker Challenge. The grant earned was for an aquaculture system project that my team and I started with Global Resolve and in partnership with 33 Buckets, for a developing community in Cusco, Peru. The project's goal is to provide the community with an extra source of iron-rich food, a deficiency their children primarily suffer, and an extra source of income.
2. Appiah Nsiah G. (2019 05 05) MasterCard Foundation Scholarship Award
3. Calvo Martinez, D.C. (2020). From Ph.D. student to Ph.D. Candidate. For successfully defending my prospectus.
4. Calvo Martinez, D.C. (2020). Block Grant. School of Sustainable Engineering and the Built Environment. Award for culminating studies
5. Calvo Martinez, D.C. (2020). Pandemic Award. Graduate College. Arizona State University. Award to cover pandemic impact in research.
6. Crane, L (2020). Fulton Undergraduate Research Initiative, Arizona State University.
7. Kupferer, R (2019 01 15). Phoenix/Scottsdale Groundwater Contamination Scholarship, Anonymous Donation to ASU Department of Civil and Environmental Engineering, Scholarship excellence and furthering research into technology that can be used to prevent or remediate groundwater contamination.
8. Levi, J (2020 March 4). Graduate Student Scholarship, Environmental Professionals of Arizona, For research and academic activities.
9. Levi, J (2020 November 4). Grad Slam Pitch Winner, ASU Graduate & Professional Student Association, for an outstanding elevator pitch on research activities.

10. Miranda, E (2020 February 13). Biodesign Travel Grant, Biodesign Institute, Expenses assistance for a Battelle conference (now postponed).
11. Nirmalkar Khemlal, 2020/07/15, salary increase based on work performance and experience.
12. Pittman, S (2020 December 9). Grand Challenge Scholars Program Research Grant Stipend, Grand Challenge Scholars Program, application was selected.
13. Reep, J. (2020 May 8). Outstanding Graduate Award, ASU SSEBE
14. Reep, J. (2020 April 1). Dean's Fellowship, ASU SSEBE
15. Reynolds, Mark - 2020 December 14 - ASU SOLS Research Training Initiative Graduate Student Support (Methanogenic enrichment, diversity, and productivity in solid waste responding to metal amendments) - reason: to fund the final chapter of my dissertation.
16. Rittmann, B (2020). Elected to Sigma Xi (2020)
17. Robles, Aide (2020 April 27). First Place Winner of 11th Annual Geosyntec Student Paper Competition, Geosyntec.
18. Sarno, A (2020 Sept 29). Graduate College Online/Remote Travel Award, ASU Graduate College, Participation in American Geophysical Union Fall 2020 Meeting.
19. Young, M. (2020 July 1). Promotion to Assistant Research Scientist

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OUTREACH AND SERVICE ACTIVITIES

OUTREACH

1. Angulo, Isabel (2020 October 7). Noche de Ciencias, Ian Salgado, Present college information to cultivate the interest of higher education and STEM to high school students, mainly minorities.
2. Dirks, Blake (2020 Summer and Fall). Assisted with content development for Science Outreach Kits with Rick Kupferer, *We've Got Your Bac* (Krajmalnik-Brown Lab).
3. Edgar Michael (2020 Jan) ASU Open Door, Volunteer
4. Eustance, Everett February 22, 2020. ASU Open Door. Team Lead for "The possibilities of algae".
5. Flores, Carole December 2020. Wrote lessons plans for outreach content developed by Rick Kupferer.
6. Flores, Carole (Feb 2020). Open Door, Biodesign at ASU, volunteer.
7. Howley, Ethan (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *Supercrobes* (Delgado Lab).
8. Kupferer, Rick (2019 02 23). Open Door, ASU, content developer & presenter Kupferer, R (2020 09). Science Outreach Kits, Swette Center, project lead, content developer & graphic designer
9. Levi, Juliana (2020 February 22). Open Door, ASU, volunteer.
10. Miranda, Evelyn (2020 February 22). Open Door, Arizona State University, Volunteer.
11. Miranda, Evelyn (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *Supercrobes* (Delgado Lab).
12. Nirmalkar Khemlal, ASU-Mayo Metabolomics and Cardiac Regeneration Symposium, 2020/02/28, ASU, Participated
13. Nirmalkar Khemlal, Fusion 2020 Biodesign Scientific Retreat, 2020/04/17, ASU, Participated
14. Nirmalkar Khemlal (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *We've Got Your Bac* (Krajmalnik-Brown Lab).
15. Reep, Jeffrey Kyle (2020 February 28). Innovate to Educate Teachers professional development Event, CBBG, Speaker
16. Scholz, Mathew (multiple dates). Sustainable Phosphorus Webinar Series, Host

17. Sundar, Skanda Vishnu (2020 Mar). ASU Open Door, volunteered in an outreach program informing the public about ongoing research efforts and uses of contaminant bioremediation.
18. Young, Michelle (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *Microbial Transformations* (Rittmann Lab).
19. Zeibich, Lydia (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *We've Got Your Bac* (Krajmalnik-Brown Lab).
20. Zheng, Chenwei (Summer and Fall 2020). Assisted with content development for Science Outreach Kits with Rick Kupferer, *Microbial Transformations* (Rittmann Lab).

OTHER SERVICE ACTIVITIES

1. Angulo, I. (2020 February 29). Project C.U.R.E Volunteering Event, Project C.U.R.E, Organized a team of 10 members to volunteer at Project C.U.R.E where medical supplies were sorted out and packaged to be delivered to third world countries.
2. Appiah Nsiah G (2020 11 30). Scholar's Day of Service, MasterCard Foundation, Participant.
3. Arrowsmith, S (2020). Our Research Coordinator, Sarah Arrowsmith is featured in Lewis, C (2020, May 14) [Cloth masks a worthy line of defense to mitigate COVID-19 pandemic](#). ASU Now: Access, Excellence, Impact.
4. Calvo Martinez, D. 2020. Engineers without Borders. Chapter: Colombia. Engineer Consultant.
5. Calvo Martinez, D. 2020. Volunteer for COVID-19 Testing Lab. Preparing Testing Kits
6. Calvo Martinez, D. 2020. Volunteer Desert Garden Montessori. Green Practices.
7. Calvo Martinez, D.C. as committee member):
 - a. Gina Pena. Universidad de los Andes, Colombia. MSc. Thesis
 - b. Klebby Dayana Corzo. Univerdidade Federal de Ouro Preto, Brazil. Undergraduate Thesis.
 - c. Jeison Arias. Universidad Antonio Narino, Colombia. Undergraduate Thesis.
8. Chan, N.I. (2020, May, July, August), Covid Inventory Team, Volunteer, Volunteer Supervisor.
9. Flores, C. (2020). Legislative District 18-member, monthly meetings, election phone banking and postcards, monthly book club member and facilitator
10. Hall, C. (2020). National Lawyers Guild, Co-Lead Legal Observer Coordinator.
11. Lai, YenJung Sean. Algae Biomass Summit, Engineering & Analysis, review committee (2020, Algal Biomass Summit conference)
12. Van Paassen, L. (2020) AEG Arizona Chapter, organizing lectures, webinars and excursions, treasurer
13. Van Paassen, L. (2020) ASCE Geo-Institute Technical committee on Soil Improvement, member
14. Van Paassen, L. (2020) ASCE Geo-Institute Technical committee on Site Investigation and Engineering Geology, member
15. Van Paassen, L. (2020) Editorial board Journal for Environmental Geotechnics
16. Torres, C.I. Editorial Board for Energies and Applied and Environmental Microbiology (AEM)
17. Torres, C.I. Chemical Engineering advisor for the Grand Challenges Scholar Program.

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APPENDIX

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Funding Awards

Sponsor	PI Last Name	Short Title	Award Start	Award End	Award Totals
Brown and Caldwell	Boltz	A model of nitrous oxide production in biological used-water treatment	10/7/2019	7/31/2020	\$25,000
Electric Power Research Institute	Boltz	Mathematical and Process Model for Biological Transformation of Selenium Oxyanions	7/16/2018	12/31/2020	\$298,033
Pepsico Inc	Boyer	NEWT Non-core Project: RPS3: Optimizing Water Use through Complementary Sensing Modalities	7/9/2020	5/31/2021	\$96,860
National Science Foundation (NSF)	Boyer	Workshop: Support for 2019 AEESP Research and Education Conference: Environmental	4/1/2019	3/31/2020	\$49,997
US Department of Defense + Colorado School of Mines	Boyer	REGENERABLE RESIN SORBENT TECHNOLOGIES WITH REGENERANT SOLUTION RECYCLING FOR SU	9/6/2018	9/5/2021	\$317,848
ASU: Center for Bio-Mediated and Bio-Inspired Geotechnics (CGGB) Consortium	Boyer	Core Project: Development of a Reactive Geocomposite Mat (RGM) Containing Steel Slag Fines and Organic Media to Remove Nitrogen and Phosphorus from	8/18/2017	7/31/2020	\$246,847
ASU: (CGGB) Consortium	Cadillo-Quiroz	Monitoring the changes in methane (CH ₄) emissions and microbes of manipulated cells of the Salt River Landfill, an Arid Zone Landfill case study (SRL)	8/1/2019	7/31/2022	\$307,492
US Department of Energy (DOE) - University of Minnesota	Cadillo-Quiroz	Biophysical processes and feedback mechanisms controlling the methane budget of an Amazonian peatland	9/1/2019	8/31/2022	\$138,452
(NSF)	Cadillo-Quiroz	CAREER: Geochemical and functional controls of methane-mediating microbes in Amazon	12/1/2018	11/30/2023	\$650,013
American Society for Microbiology	Cadillo-Quiroz	SM Fellowship	6/1/2015	5/31/2016	\$3,500

NSF: Directorate for Biological Sciences (BIO)	Cadillo-Quiroz	Collaborative Research: Forest productivity and hydrological patterns regulate methane fluxes from peatlands in the Amazon basin	5/1/2014	4/30/2019	\$643,874
Phoenix/Scottsdale Groundwater Contamination Endowment - Arizona State University Foundation (ASUF)	Delgado	Metabolic Exploration and Microbial Enrichment for Reductive Defluorination of Per- and Polyfluoroalkyl Substances (PFASs)	1/1/2020	12/31/2021	\$50,000
Chevron Energy and Technology Company	Delgado	Natural organic components in soils interfering with TPH analytical measurements: identification, characterization, and possible solutions	8/12/2019	12/31/2021	\$72,642
ASU: (CGGB) Consortium	Delgado	CBBG Core Project: Freeport McMoRan: Proposal for Passive Remediation of Acid Roc	9/1/2018	5/31/2020	\$82,787
Finch Therapeutics Group	Krajmalnik-Brown	METAGENOMIC STUDY FOR PHASE-1 AND FOLLOW UP ASD-MTT, YEAR 2020-21	3/1/2020	8/31/2021	\$162,327
Finch Therapeutics Group	Krajmalnik-Brown	Enhanced Statistical Analysis of Phase 1 FMT Trial	3/1/2018	9/30/2020	\$219,417
HHS: National Institutes of Health (NIH)	Krajmalnik-Brown	Integrating Quantitative Energetics Determines the Microbiome's Contribution to Energy Balance	9/1/2016	6/30/2021	\$3,492,583
Pepsico Inc	Rittmann	NEWT Non-core Project: RPS 2: Advancing the Anaerobic Biofilm Membrane Bioreactor	7/9/2020	7/31/2021	\$147,982
OCP SA	Rittmann	Recovery of Sulfur and Rare-earth Metals from Ortho-Phosphate Production	6/10/2020	6/9/2024	\$838,234
US Department of Defense (DOD)	Rittmann	A Synergistic Platform for Defluorination of Perfluoroalkyl Acids (PFAAs) through Catalytic Reduction Followed by Microbial Oxidation	4/3/2020	4/2/2022	\$200,000
US Department of Defense (DOD)	Rittmann	Biodegradation of 1,4-Dioxane Using Ethane as the	8/15/2019	8/14/2021	\$327,394

		Primary Substrate in the O2-Based Membrane Biofilm Reactor			
Xylem, Inc.	Rittmann	NEWT Non-Core Project - Reductive Defluorination and Mineralization of PFOA	4/1/2019	1/31/2021	\$190,901
DOE: Office of Energy Efficiency and Renewable Energy (EERE)	Rittmann	Membrane Carbonation for 100% Efficient Delivery of Industrial CO2 Gases	10/1/2018	9/30/2020	\$1,992,766
(NSF)	Rittmann	Enhancing Biodegradation of Quaternary Ammonium Compounds (QAC)	7/1/2017	6/30/2021	\$379,738
(NSF)	Rittmann	SusChEM: COLLABORATIVE RESEARCH: Engineering the Hollow-Fiber Membrane Biofilm Reactor to Convert Syngas to Valuable Products	7/1/2016	6/30/2020	\$209,022
DOD-NAVY: Office of Naval Research (ONR)	Torres	Cryogenic electron tomography of the intracellular/extracellular interface of <i>Geobacter sulfurreducens</i>	4/1/2020	3/31/2022	\$138,781
DOD-NAVY: Office of Naval Research (ONR)	Torres	Enabling 3D Fluorescence Imaging Under Anaerobic Environments	6/15/2019	6/14/2020	\$182,326
DOD-NAVY: Office of Naval Research (ONR)	Torres	Generating electrical power from blackwater using microbial fuel cells	2/18/2019	2/28/2022	\$275,807
ASU: (CGGB) Consortium	van Paassen	Feasibility Study to evaluate potential applications of biocementation through MICP by urea hydrolysis for iron ore mine tailings (ArcelorMittal)	10/1/2019	9/23/2020	\$95,000
Rice University	Zhou	SEED - Funding Project: Defluorination of PFAS Using H2-based Catalytic Membrane Reactor	1/28/2020	11/30/2020	\$18,545

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Publications

1. Anam, M., S. Yousaf, N. Ali (2020). Comparative Assessment of Microbial-Fuel-Cell Operating Parameters. *Journal of Environmental Engineering* 146 (9): 04020093, DOI:10.1061/(ASCE)EE.1943-7870.0001772.
2. Barciela-Rial, M., Van Paassen, L.A., Griffioen, J., Van Kessel, T. & Winterwerp, J.C. (2020) The Effect of Solid Phase Composition on the Drying Behaviour of Markermeer Sediment, *Vadose Zone Journal*, accepted April 20 2020 <https://doi.org/10.1002/vzj2.20028>
3. Bi, Y., A. K. Marcus, H. Robert, R. Krajmalnik-Brown, B. E. Rittmann, P. Westerhoff, M.-H. Ropers, and M. Mercier-Bonin (2020). The complex puzzle of dietary silver nanoparticles, mucus and microbiota in the gut. *Journal of Toxicology and Environmental Health, Part B: Critical Reviews* 23(2): 69-89. DOI 10.1080/10937404.2019.1710914
4. Boltz, J.P., Rittmann, B.E. (2020). Microbial ecology of selenium-respiring bacteria. In: *Environmental Technologies to Treat Selenium Pollution: Principles and Engineering*. Eds. Lens, P., Pakshirajan, K. IWA Publishing. London, United Kingdom.
5. Buessecker, S*, Zamora, Z., Sarno, A., D. R. Finn, A. M. Hoyt, J. van Haren, J. D. Urquiza Muñoz, and Cadillo-Quiroz, H.* 2021. Microbial communities and interactions of nitrogen oxides with methanogenesis in diverse peatlands of the Amazon basin. *Frontiers in Terrestrial Microbiology* (Submitted).
6. Calvo Martinez D.C., Ontiveros-Valencia A.V. Ontiveros-Valencia, A. Krajmalnik-Brown, R., Torres, C.I.; Rittmann, B.E. Submitted October 30 2020 - Accepted with major revisions. Carboxylates production in an autotrophic hydrogen-based Membrane Biofilm Reactor. *Biotechnology and Bioengineering*.
7. Calvo Martinez, D.C., Jang, H-Y, Torres, C.I., Lively, R., Rittmann, B.E.. (2020) Engineering the Hollow-Fiber Membrane Biofilm Reactor to Convert Syngas to Valuable Products. Award #: 1603656. We successfully submitted our Final Report of our NSF project, having an amazing feedback beyond satisfaction. The report was qualified as excellent.
8. Chandra, R., F. P. Pons-Faudoa, R. Parra-Saldivar, and B. E. Rittmann (2020). Effect of ultra-violet exposure on increasing the production of mycosporin-like amino acids and saturated lipids by *Lyngbya purpurem*. *Biomass & Bioenergy* 134: 105475. DOI.org/10.1016/j.biombioe.2020.105475
9. Chen, T., B. M. Yavuz, A. G. Delgado, B. Januszewski, Y. Zuo, P. Westerhoff, R. Krajmalnik-Brown, and B. E. Rittmann (2020). Multi-cycle ozonation + bioremediation for soils containing residual petroleum. *Environ. Engr. Sci.* 36: 1443-1451.
10. Corbin, Karen D., Rosa Krajmalnik-Brown, Elvis A. Carnero, Christopher Bock, Rita Emerson, Bruce E. Rittmann, Andrew K. Marcus, et al. 2020. "Integrative and Quantitative Bioenergetics: Design of a Study to Assess the Impact of the Gut Microbiome on Host Energy Balance." *Contemporary Clinical Trials Communications* 19 (September): 100646. <https://doi.org/10.1016/j.conctc.2020.100646>.
11. Davis, Taylor L, Blake Dirks, Elvis A Carnero, Karen D Corbin, Jonathon Krakoff, Shannon Parrington, Donghun Lee, et al. 2020. "Chemical Oxygen Demand Can Be Converted to Gross Energy for Food Items Using a Linear Regression Model." *The Journal of Nutrition*. <https://doi.org/10.1093/jn/nxaa321>.
12. Desmond-Le Quéméner, E. Moscoviz R, Bernet N, Marcus, A (2020) Modeling of interspecies electron transfer in anaerobic microbial communities. *Current Opinion in Biotechnology* Davis TL, Dirks B, Carnero EA, Corbin KD, Krakoff J, Parrington S, Lee D, Smith SR, Rittmann BE, Krajmalnik-Brown R, Marcus AK (2020). Chemical oxygen demand can be converted to gross energy for food items using a linear regression model. *The Journal of Nutrition*.
13. Edgar, M., Ray, H., Grubb, D.G., van Paassen, L.A., Hamdan, N., & Boyer, T.H., (2020) Removal of Phosphate and Nitrate from Impacted Waters via Slag-Driven Precipitation and Microbial Transformation, *Journal of Sustainable Water in the Built Environment*, 6 (2), 04020007, <https://doi.org/10.1061/JSWBAY.0000914>
14. Edgar, M., & Boyer, T. H. (2021). Removal of natural organic matter by ion exchange: Comparing regenerated and non-regenerated columns. *Water Research*, 189, 116661. doi:<https://doi.org/10.1016/j.watres.2020.116661>

15. Eustance, E., Lai, YS., Shesh, T., Rittmann, BE. 2020. Improved CO₂ utilization efficiency using membrane carbonation in outdoor raceways. *Algal Research*. <https://doi.org/10.1016/j.algal.2020.102070>
16. Finn D. *, Ziv-El M. *, van Haren J., Park J., del Aguila Pasquel, J.,Urquiza-Muñoz, D.,Cadillo- Quiroz H. 2020 Methanogens and Methanotrophs Show Nutrient-Dependent Community Assemblage Patterns Across Tropical Peatlands of the Pastaza-Marañón Basin, Peruvian Amazonia. *Front Microbiol.* 2020;11:746
17. Gao, Y., Hang, L., He, J., Zhang, F., & Van Paassen, L. (2020). Pullout behavior of geosynthetic reinforcement in biocemented soils. *Geotextiles and Geomembranes*, <https://doi.org/10.1016/j.geotexmem.2020.10.028> 2)
18. Griffis, T., Roman, T., Wood, J., Deventer, J., Malaverri, L., Rengifo, M., del Castillo, Torres, J., Lilleskov, E., Kolka, R., Chimner, R., Wayson, C., Hergoualc'h, K., Baker, J., Ricciuto, D., Cadillo-Quiroz, H. Ricciuto D.M. 2020. Hydrometeorological sensitivities of net ecosystem carbon dioxide and methane exchange of an Amazonian palm swamp peatland. *Agricultural and Forest Meteorology* 295: 108167.
19. Gutierrez, Daniel, Anthony Weinstock, Vijay C. Antharam, Haiwei Gu, Paniz Jasbi, Xiaojian Shi, Blake Dirks, et al. 2020. "Antibiotic-Induced Gut Metabolome and Microbiome Alterations Increase the Susceptibility to *Candida Albicans* Colonization in the Gastrointestinal Tract." *FEMS Microbiology Ecology* 96 (1): 1–15. <https://doi.org/10.1093/femsec/fiz187>.
20. Hall, C.A. McCutcheon, G., Morton, E.V., Tindell, R. K., and N. Weller. "Strategies to curtail Valley Fever in Arizona: A policy memorandum to Congressman Greg Stanton." *Journal of Science Policy and Governance*, 16(1).
21. Hussain, J., X. Wang, L. Sousa, R. Ali, B. E. Rittmann, and W. Liao (2020). Evaluation of green algae to simultaneously fix carbon dioxide and produce proteins, carbohydrates, or lipids using a multi-objective optimization. *Biomass Bioenergy* 141: 105711. [Doi.org/10.1016/j.biombioe.2020.105711](https://doi.org/10.1016/j.biombioe.2020.105711).
22. Ilhan, Z. E., J. K. DiBaise, S. E. Dautel, N. G. Isern, Y.-M. Kim, D. W. Hoyt, A. A. Schepmoes, H. M. Brewer, K. K. Weitz, T. O. Metz, M. D. Crowell, D.-W. Kang, B. E. Rittmann, and R. Krajmanlik-Brown (2020). Temporospatial shifts in the human gut microbiome and metabolome after gastric bypass surgery. *Biofilms and Microbiomes* 6: 12, doi.org/10.1038/s41522-020-0122-5.
23. Joshi S, Robles A, Aguiar S, Delgado AG (2021) The occurrence and ecology of microbial chain elongation of carboxylates in soils. *ISME Journal*. <https://doi.org/10.1038/s41396-021-00893-2>
24. Kabir SF, Zheng R, Delgado AG, Fini EH (2021). Use of microbially desulfurized rubber to produce sustainable rubberized bitumen. *Resources, Conservation & Recycling* 164: 105144. <https://doi.org/10.1016/j.resconrec.2020.105144>
25. Kang D-W^X, Adams JB, Vargason T, Santiago M, Hahn J, Krajmalnik-Brown R. 2020. "Distinct fecal and plasma metabolites in children with autism spectrum disorders and their modulation after microbiota transfer therapy". *mSphere* 5:e00314-20. <https://doi.org/10.1128/mSphere.00314-20>.
26. Lai, YS., Eustance, E., Shesh, T., Rittmann, BE. 2020 Enhanced carbon transfer and utilization efficiencies achieved using membrane carbonation with gas sources having a range of CO₂ concentrations. *Algal Research* <https://doi.org/10.1016/j.algal.2020.102098>
27. Liu, Y., Lai, YS., Rittmann, BE. 2020. Effects of solids retention times on electro-selective fermentation using *Scenedesmus acutus* biomass. *Sustainable Energy & Fuels*. <https://doi.org/10.1039/D0SE00930>
28. Liu, Y., Y.-J. Lai, and B. E. Rittmann (2020). Increased anode respiration enhances utilization of short-chain fatty acid and lipid wet-extraction from *Scenedesmus acutus* biomass in Electro Selective Fermentation. *Renewable Energy* 148: 374-379. DOI 10.1016/j.renene.2019.10.043.
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70. Zhou, L., H. Wang, Z. Zhang, J. Zhang, H. Chen, X. Bi, X. Dai, S. Xia, L. Alvarez-Cohen, B. E. Rittmann (2021). Novel perspective for urban water resource management: 5R generation. *Front. Environ. Sci. Engr.* 15(1): 16. Doi.orr/10.1007/s11783-020-1308-z.
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Posters and Talks

1. Agbo B, (2020 October 26). Electrokinetics for aiding in carbonate precipitation applications. 2nd AfroBiotech Conference, via zoom.
2. Agbo B, (2020 October 28). Electrokinetics for aiding in carbonate precipitation applications. Annual CBBG conference, via zoom.
3. Arnal, L., Illingworth, S., Chegwidan, O., and C.A. Hall. "Consilience – exploring the spaces where the sciences and the arts meet." American Geophysical Union Fall Meeting, San Francisco, CA, December 2020.
4. Boltz, J.P., Rittmann, B.E. (2020). A model of selenium, sulfur, and nitrogen species*. Electric Power Research Institute, Selenium Summit. October 21, 2020. Virtual event.
5. Boltz, J.P., Rittmann, B.E. (2020). A model of selenium, sulfur, and nitrogen species (SeSANS) for process design, comparison, and optimization*. North American Metals Council. November 9, 2020. Virtual event.
6. Boltz, J.P., Rittmann, B.E. (2020). Applying a model of selenium, sulfur, and nitrogen species (SeSANS) for process design and optimization*. TECK Coal, Technology Transfer. November 12, 2020. Virtual event.
7. Boltz, J.P., Rittmann, B.E. (2020). Microbial reduction of selenate, selenite, and sulfate. Research Frontiers in Chalcogen Cycle Science and Technology, G16. December 11, 2020. Virtual event.
8. Brewer, P.E. and H. Cadillo-Quiroz. (2020-12-11). Magnitudes and Controls of Stem Methane Emissions in Amazonian Peatland Forests. American Geophysical Union Annual Meeting, San Francisco, CA.
9. Cadillo-Quiroz, H. 2020. "On how stocks, fluxes, geochemistry and microbes from the tropics would have global effects: a tale from the peatlands". Universidad Autonoma de Mexico, campus Leon.
10. Cadillo-Quiroz, H., Buessecker, S., Ostrom, N., Gücker, B., Urquiza-Muñoz, J., Penton, R., Pérez, A., Boëchat, I., Holbert, K., Panduro Pisco, G., Sarno, A. Fontanez Ortiz, M. and Reynolds, M. 2020. A novel coupled cycling of abiotic denitrification and N₂O-reduction is frequent across tropical peatlands. American Geophysical Union (AGU) Fall meeting.
11. Calvo D., Ontiveros-Valencia A., Krajmalnik-Brown R., Torres C.I., Rittmann B.E. Using the MBfR as a production system: Autothrophic production of carboxylates. IWA Biofilms 2020. Virtual Conference. Dec 5-9 2020.
12. Calvo D., Ontiveros-Valencia A., Krajmalnik-Brown R., Torres C.I., Rittmann B.E. Carbon cycling through carboxylates production in a hydrogen-based Membrane Biofilm Reactor. 2nd Latin American and Caribbean Young Water Professional conferences: Towards Sustainable Development, virtual mode, 8-12 November, 2020
13. Calvo, D., Ontiveros-Valencia, A., Krajmalnik-Brown, R., Torres, C.I., Rittmann, B.E.; The role of inorganic carbon in a hydrogen-based Membrane Biofilm Reactor. 1st International Chain Elongation Conference. October 26-27, 2020. Virtual conference.
14. Calvo, D., Torres, C.I., Yang, H.Y., Lively, R., Rittmann, B.E.; Effects of operational parameters in biofuel precursors production using a syngas-based Membrane Biofilm Reactor. 10th Annual Graduate Research Symposium. 2020. Tempe, Arizona.
15. Carlson, G., Malloy, J., Dupuis, C.A., Blackwell, E., Buie II, E., Chapman, B., Garani, J., Gopal Krishna, M., Hall, C.A., and A. Herbst. "Space Behind Bars: Teaching Earth and Space Science in an Arizona Prison." American Geophysical Union Fall Meeting, San Francisco, CA, December 2020.
16. Crane L, Ray H, Hamdan N, and Boyer T (2020 November 20). Enzyme-Induced Carbonate Precipitation (EICP) Using Fresh Urine and Calcium-Rich Zeolites. FURI Symposium, Tempe, Arizona.*
17. Davis, T., Rittmann, B., Krajmalnik-Brown, R., Marcus, A. (2020 Nov. 17). A Mathematical Model to Study the Effects of Gut Microbes on the Human Host's Energy Balance. Virtual AIChE Annual Meeting. Virtual.
18. Delgado AG. Organic carbon manipulation and contaminant dehalogenation mediated by microbial chain elongation in soils. ASM Microbe 2020 – virtual, July 28, 2020 (Oral presentation)
19. Delgado AG, Joshi S, Robles A, Aguiar S#. The occurrence and ecology of microbial chain elongation of carboxylates in soils. 1st International Chain Elongation Conference – virtual, October 26-27, 2020. (Oral presentation)

20. Dietz R, and Boyer T (2020/01/09) Removal of Per and Polyfluoroalkyl Substances (PFAS) using regenerable resin technology. AZ Water Research Symposium: PFAS Occurrence, Research and Treatment Implementation, Phoenix, AZ.
21. Dietz R, and Boyer T (2020/01/24) Removal of Per and Polyfluoroalkyl Substances (PFAS) using regenerable resin technology. 10th Annual SSEBE Graduate Research Symposium, Tempe, AZ. Dietz R, and Boyer T (2020/07/13-24) Removal of Per and Polyfluoroalkyl Substances (PFAS) using regenerable resin technology. AZ Water Association 93rd Annual Conference, Phoenix, AZ.
22. Dietz R, and Boyer T (2020/06/17) Removal of Per and Polyfluoroalkyl Substances (PFAS) using regenerable resin technology. 2020 SSHA International High Technology ESH Symposium & Exposition, Scottsdale, AZ.
23. Edgar M, Removal of Natural Organic Matter by Ion Exchange: Comparing Regenerated and Non-regenerated Columns. AZ Water Research Symposium, Phoenix AZ
24. Ehsasi, F. Van Paassen L. (2020), MICP for Dust Mitigation in Mine Tailings, Treatment Optimization and Durability Assessment, CBBG annual meeting, ASU, October 28, 2020 (poster)
25. Eustance E, Lai YS, Flory J, McGowen J, Rittmann, BE. Presentation at Algae Biomass Summit 2020, Virtual. Utilizing Membrane Carbonation with Synthetic Flue Gas and Biogas in Outdoor Raceways
26. Glaser, D., Hartnett, H., Finn, D., Cadillo-Quiroz, H., Perez-Montano, S. and Desch, S. 2020. Water Vapor Adsorption May Provide as Much Water as Rainfall into the Hyperarid Soils of the Atacama Desert. American Geophysical Union (AGU) Fall meeting.
27. Griffis, T., Roman, T., Wood, j., Deventer, M., Fachin, L., Rengifo, J., Lilleskov, E., Kolka, R., Chimner, R., Wayson, C., Cadillo-Quiroz, H., Baker, J., Hergoual'h, K. and Ricciuto, D. 2020. Hydrometeorological sensitivities of net ecosystem carbon dioxide and methane exchange of an Amazonian palm swamp peatland. American Geophysical Union (AGU) Fall meeting.
28. Hall, C.A., Hut, R., Drost, N., Van De Giesen, N., van Werkhoven, B., Aerts, J.P.M., Weel, B., Pelupessy, I., Dzigian, Y., Verhoeven, S., van den Oord, G., van Haren, R., van Meersbergen, M., Hutton, E., Alidoost, F., Camphuijsen, J., and B. Andela. "eWaterCycle: Putting the Public in Charge is Only FAIR." American Geophysical Union Fall Meeting, San Francisco, CA, December 2019.
29. Hall, C.A.. "Beyond H-Index: Re-Defining Success in Academia." American Geophysical Union Fall Meeting, San Francisco, CA, December 2019. Hall, C.A., van Turnhout, A., van Paassen, L.A., and B. Rittmann. "Understanding the Effect of Environmental Conditions on Bio-Based Ground Improvement Strategies for Infrastructure Resilience." American Geophysical Union Fall Meeting, San Francisco, CA, December 2020.
30. Hall, C.A., Howley, E., Morton, E., Murphy, E., Bercovici, H., Tindell, K.R., McCutcheon, G., Solves, J-P., Kurtz, L., Phillips, M., Bersson, J., Bernard, M., Dirks, B., and N. Weller. "Keeping Up the Momentum: Early Career Scientists in Policy-making and Community Science." European Geoscience Union General Assembly, Vienna, Austria May 2020.
31. Hall, C.A., Rittmann, B., van Paassen, L., and E. Kavazanjian. "Out of the Lab, Into the Frying Pan: Understanding the Effect of Groundwater Conditions on Bio-Based Ground Improvement Strategies." European Geoscience Union General Assembly, Vienna, Austria May 2020.
32. Hall, C.A., Rittmann, B. Kavazanjian, E. & van Paassen, L. (2020) Effect of Coastal Water on Microbially Induced Desaturation and Precipitation (MIDP) via Denitrification, CBBG annual meeting, ASU, October 28, 2020 (poster)
33. Howley E, Krajmalnik-Brown R, Torres C (2020 June 19). Formate causes metabolic changes in anode biofilms of *G. sulfurreducens* similar to the hydrogen growth response. ASM Microbe. Virtual
34. Howley E, Torres C (2020 October 8). Evaluating performance of a commercial MFC with simulated blackwater. ISMET Virtual
35. Hoyt, A., Bazán Pacaya, A., Jacobs, M., Xu, X., Torn, M., Shapiama Peña, R., Ramirez Navarro, D., Trumbore, S., Urquiza-Muñoz, D., and Cadillo-Quiroz, H. 2020. Understanding Methane Production across Diverse Tropical Peatlands. American Geophysical Union (AGU) Fall meeting.

36. Hubbard, Z. Torres, C. & Van Paassen, L.A. (2020) Microbially Induced Iron Precipitation for Permeability Reduction, CBBG annual meeting, ASU, October 28, 2020 (poster)
37. Hut, R., Drost, N., Aerts, J., Bouaziz, L., van Verseveld, W., Jagers, B., Baart, F., Sutanudjaja, E., Melsen, L., Bennett, A., Arnal, L., Fenicia, F., Santos, L., Gelati, E., Dal Molin, M., Knobon, W., Gharari, S., Hall, C.A., Hutton, E., van de Giesen, N., van Werkhoven, B., van Haren, R., Dzigan, Y., Camphuijsen, J., Alidoost, F., Pelulessy, I., Weel, B., van den Oord, G., Verhoeven, S., Andela, B., and P. Kalverla. "Comparing the impact for hydrology of the new ERA5 reanalyses dataset over ERA-Interim for 8 hydrological models in 6 catchments using the eWatercycle community modelling environment." European Geoscience Union General Assembly, Vienna, Austria May 2020.
38. Hut, R., Hall, C.A., Drost, N., and N. van de Giesen. "eWatercycle: Fully open and transparent hydrological data and modelling platform facilitates FAIR policy-making." European Geoscience Union General Assembly, Vienna, Austria May 2020.
39. Kanawade S, Hubbard Z (2020 October 27). Microbially Induced Iron Precipitation for Permeability Reduction. CBBG Annual Meeting.
40. Krajmalnik-Brown, R. and Jim Adams. "Metabolite Changes Through Microbiota Transplant Therapy" Synchrony Clinical Trials, virtual conference, December 2020
41. Krajmalnik-Brown, R. and Jim Adams. "Microbiota Transplant Therapy for Autism" Synchrony virtual conference, November 2020
42. Krajmalnik-Brown, R. "Autism Clinical Trials" Microbiome for Mars Virtual Workshop. July 2020
43. Krajmalnik-Brown, R. "Can Changing Gut Bacterial Communities Improve Gastrointestinal and Autism Symptoms?" Fermentation seminar speaker Rutgers University. June 2020.
44. Krajmalnik-Brown, R. and Jim Adams. Microbiota Transfer Therapy for Autism. Kennedy Krieger Institute grand rounds seminar. February 2020.
45. Krishnan, V. Kavazanjian, E., Van Paassen, L., Khodadadi Tirkolaei, H. Hamdan, N. & Martin, K. (2020), Variability in properties and behavior of an EICP-treated "standard" sand from three different sources, CBBG annual meeting, ASU, October 28, 2020 (poster)
46. Lai YS (2020, 12/02). Valorization of industrial CO2 streams via membrane carbonation for microalgal cultivation. Biodesign Swette Center for Environmental Biotechnology, ASU, Tempe, Arizona
47. Levi J, Guo S, Luo Y, Lee C, Kavadiya S, Garcia-Segura S, Zhou C, Holman Z, Wong M, Rittmann B, and Westerhoff P (2020 November 17). Nano-Enabled Hollow Fibers for the Catalytic Hydrogenation of Nitrate. American Institute of Chemical Engineers Annual Meeting, virtual).
48. Li, X., Enns, A., Wong, P. van Paassen, L.A. & Tao, J. (2020) A Local Scour Protection Method Inspired By Mangrove Model, CBBG annual meeting, ASU, October 28, 2020 (poster)
49. Long M (November 10, 2020). Defluorination of Perfluoroalkyl Substances (PFAS) by PGM (platinum-group metals) catalysts. Environmental Engineering Seminar Series, Tempe.
50. Mangus, A. (2020 April 24). Culturing Conditions of Synechocystis sp. PCC 6803 Mutant for Microbial Electro-Photosynthesis. FURI Fall 2020 Symposium, Tempe, AZ.
51. Miranda E, Reep K, Severson C, Landrum C, Edgar E, Hansen S, Santisteban L, Hamdan N, and Delgado A (2020 October 28). Passive remediation of acid mine drainage via coupled treatment approach. Center for Bio-mediated and Bio-inspired Geotechnics Annual Meeting, (Tempe, AZ).
52. Miranda E and Delgado A (2020 September 25). Passive remediation of acid mine drainage via coupled treatment approach. Center for Bio-mediated and Bio-inspired Geotechnics Seminar, (Tempe, AZ).
53. Peraza, I (September 23rd 2020). Modeling the Spread of COVID-19 with COMSOL Multiphysics, via zoom.
54. Richard, R., 2020. School Building Flushing. Talk at Annual Regional Water Quality Workshop., Webinar, 23 October 2020. Richard, R., 2020. School Building Flushing. Talk at Building Water Research Symposium., Webinar, 13 October 2020.
55. Rittmann, BE (March 10). "Synergistic Remediation of 1,4-Dioxane, TCE, and TCA in Groundwater," SERDP/ESTCP Conference on Emerging Contaminants, Denver, CO.

56. Rittmann, BE (April 7) "From Treatment to Resource," Central State Water Environment Association Education Seminar (Webinar). April 7 – "Prying Open the Black Box," Central States Water Environment Association Education Seminar (Webinar).
57. Rittmann, BE (May 21) "Emerging Environmental Biotechnology to Treat Organic Waste," IIT-Madras Symposium on Water Challenges During and Post COVID-19 (Webinar).
58. Rittmann, BE (May 21) "What the Future Holds," AzWater Association Webinar on Anaerobic Bioreactors. June 18 "Synergistic Remediation of 1,4-Dioxane, TCE, and TCA in Groundwater," SERDP/ESTCP Webinar.
59. Rittmann, BE (June 25) "A Synergistic Platform for Defluorination of Perfluoroalkyl Acids (PFAAs) through Catalytic Reduction Followed by Microbial Oxidation," Noblis Webinar.
60. Rittmann, BE (November 10) "Environmental Biotechnologies for Water Sustainability," IWA Young Professionals Conference, Manizales, Colombia.
61. Rittmann, BE (December 8) "Biofilms on Active Substrata – Hyper-partnering with Microorganisms," IWA Biofilm Specialist Group International Conference, South Bend, IN.
62. Robles A, Yellowman TL, Joshi S, Rangan SM, Delgado AG (2020 Oct 1). Microbial Chain Elongation Drives Complete Reductive Dechlorination of Trichloroethene. Geosyntec Webinar Series, Phoenix, AZ.
63. Robles A, Yellowman TL, Joshi S, Rangan SM, Delgado AG (2020 Oct 27). Harnessing Hydrogen Production during Microbial Chain Elongation for Reduction of Oxidized Groundwater Contaminants. International Chain Elongation Conference, Wageningen, Netherlands.
64. Sarno, A., Bourquin, B., Bahta, H. and Cadillo-Quiroz, H. 2020. Evaluation of the Relationship of Climate on Primary versus Secondary Fermentation of Poor Fen Northern Peatlands Using DNA-Stable Isotope Probing. American Geophysical Union (AGU) Fall meeting.
65. Scholz, M. (2020 11 19). Phosphorus 101 (keynote). Mid-Atlantic Biosolids Annual Conference.
66. Stallings-Young, E.G. (*~), Zapata, C.E. & van Paassen, L.A. (2020) Unsaturated Fluid Flow through Granular Soils Treated with Microbial Induced Desaturation and Precipitation, Unsaturated Horizons, Proceedings of the 4th European Conference on unsaturated soils, June 24-26, 2020, Lisboa Portugal (oral presentation)
67. Stallings-Young, E., Van Paassen, L.A. Zapata, C. & Kavazanjian, E. (2020), Microbially Induced Desaturation of Stratified Soils, CBBG annual meeting, ASU, October 28, 2020 (poster)
68. Torres CI. The use of microbial electrochemistry at the wastewater treatment plant. Invited speaker for Civil and Environmental Engineering Seminar at Princeton University, Nov 2020.
69. Torres CI. electrochemical and omic analyses on potential-dependent pathway shifts in *G. sulfurreducens*. Plenary speaker at ISMET Online Conference, Oct 2020.
70. Trotter, B., Van Paassen L.A. & Ehsasi, F. (2020) Engineered Sandcastles, CBBG annual meeting, ASU, October 28, 2020 (poster)
71. Van Paassen, L.A., Ngan-Tillard, D.J.M. & Verhoef, P.N.W. (2020) Interactive Games for Teaching Site Investigation and Engineering Geology, AEG 2020 Virtual Annual Meeting, September 16-18, 2020 (online poster)
72. Van Paassen, L.A. Khosravifar, A. Moug, D. & Kavazanjian E. (2020) Microbially Induced Desaturation (MID), a New Method to Mitigate Earthquake-Induced Liquefaction, AEG 2020 Virtual Annual Meeting, September 16-18 2020 (invited lecture)
73. Van Paassen, L.A. (2020) Field trials on Bio-based Ground Improvement Methods, 26th IACGE Geotechnical Workshop, International Association of Chinese Geotechnical Engineers, January 23, 2020 10) Hall, C., Rittmann, B., van Paassen, L., & Kavazanjian, E. (2020, May). Out of the Lab, Into the Frying Pan: Understanding the Effect of Natural Groundwater Conditions on Bio-Based Ground Improvement Strategies. In EGU General Assembly Conference Abstracts (p. 11378).
74. Van Paassen, L. (2020) Progress update CBBG Thrust 2 - Environmental Protection and Restoration, CBBG annual meeting, ASU, October 28, 2020

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75. Van Paassen, L.A. (2020) Soil Stabilization through desaturation and precipitation by nitrate reducing bacteria, International Conference on Microbial Biotechnology in Construction Materials and Geotechnical Engineering (MBCMG2020), (invited keynote lecture)
 76. Van Paassen, L.A.(*), Oliveira, B.R.F., Zain, N.H.M.(~) & Jommi, C. (2020) Subsidence of dredged organic sediments in cultivated peatlands, Unsaturated Horizons, Proceedings of the 4th European Conference on unsaturated soils, June 24-26, 2020, Lisboa Portugal (oral presentation)
 77. Wang, L.(*), van Paassen, L.A.(~), & Kavazanjian, E. (2020) Feasibility Study on Liquefaction Mitigation of Fraser River Sediments by Microbial Induced Desaturation and Precipitation (MIDP) Geo-Congress 2020: Biogeotechnics, 121-131 (oral presentation)
 78. Woolley, M.A.(*~), van Paassen, L.A. & Kavazanjian E. (2020) Impact on Surface Hydraulic Conductivity of EICP Treatment for Fugitive Dust Mitigation, Geo-Congress 2020: Biogeotechnics, 132-140 (poster)

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Conferences and Workshops (Attended)


1. Saetta, D. Urine Diversion Summit (2020 September 15-17), Rich Earth Institute, Virtual.
2. Levi, J. 16th Annual EPAZ Conference (2020 March 4-5), Environmental Professionals of Arizona, Phoenix, AZ.
3. Russell A, Howley E, Torres D (2020 March 3). Development of microbial fuel cells for the production of electrical energy from wastewater. WAESO, Tempe, AZ.
4. Skinner, J. CBBG Annual NSF Meeting (2020 October 27), Arizona State University, Tempe, Arizona
5. Howley, E. ASM Conference on Undergraduate Education. (2020 July 9), Virtual
6. Angulo, I. SHPE National Conference (2020 October 30), Society of Hispanic Professional Engineers, Web. Angulo, I. National Institute of Leadership Achievement (NILA) (2020 August 8), Society of Hispanic Professional Engineers, Web.
7. Nirmalkar Khemlal, Synchrony 2020 , 2020/12/01, Brain Foundation, USA;
8. Nirmalkar Khemlal, GRASP 2020, 2020/09/01, ASU, Arizona, USA;
9. Nirmalkar Khemlal, Anaerobe 2020, 2020/07/23, Seattle, USA;
10. Nirmalkar Khemlal, Microbiome For Mars, 2020/07/13, California Institute of Technology (Caltech) and Translational Research Institute for Space Health (TRISH), USA
11. Brewer, PE. LICOR Eddy Covariance Training Workshop (2020-1-25) LICOR Inc., Lincoln, NE.
12. Hall, C., American Geophysical Union Fall Meeting (2020 April), American Geophysical Union,
13. Virtual. Hall, C., European Geosciences Union General Assembly (2020 December), European
14. Geosciences Union, Virtual. Hall, C., CARN 2020 (2020 October), Collaborative Action Research
15. Network, Virtual. Hall, C., Voices for Science (2020 April), American Geophysical Union, Virtual.

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Patents and Disclosures

PATENT APPLICATIONS

1. Boltz, J.P., Rittmann, B.E., Daigger, G.T. (2020). Wastewater treatment systems and methods (anaerobic biofilm membrane bioreactor). USPTO. Patent Application No. 63121363. Boltz, J.P., Rittmann, B.E., Daigger, G.T., Katz, L.E. (2020). Systems and methods for biological transformation, concentration, and recovery of selenium from wastewater. USPTO. Patent Application No. 63121540.
2. Delgado AG, Fini E, Kabir SF. A method and system for microbial desulfurization and surface-activation of rubber. Invention ID D21-034, Tech ID M21-071P, submitted 09/01/2020.
3. Rangan, S. M., Krajmalnik-Brown, R., Delgado, A. G. METHODS FOR SIMULTANEOUS QUANTIFICATION OF ANIONS USING ION CHROMATOGRAPHY AND SUPPRESSED ION CONDUCTIVITY. 2020 Oct 9. Application number: 63089945
4. Rittmann B, Tang Y, Zhou C, Luo Y, and Krajmalnik-Brown R (2020) A system for removing trichloroethane, trichloroethene, and 1,4-dioxane from contaminated water and wastewater. Application # 63/040,512.
5. Rittmann, Bruce Tempe, AZ (US); Everett Eustance, Queen Creek, AZ (US); Yen - Jung Lai, Tempe, AZ (US); Justin Flory, Scottsdale, AZ (US); Diana Calvo Martinez, Phoenix, AZ (US); Tarun Shesh, Tempe, AZ (US). Application submitted. METHOD AND SYSTEM FOR MEMBRANE CARBONATION. Application Number: US 2020/0283716 A1. Applicant: Arizona Board of Regents on behalf of Arizona State University, Scottsdale, AZ.
6. Zhou C, Rittmann B, and Long M (2020) Methods and Systems for Producing Selenium During Selenate Removal from Water. Application # 63/005,955 Zhou C, Rittmann B, Zhou D, Luo Y, Long M, and Zheng, C

- 
- (2020) A catalytic apparatus and method for removing oxidized contaminants from water and wastewater. Application # 63/040,513
7. Zhou C, Rittmann B, and Zheng C (2020) An apparatus and method for treating ammunition-contaminated water and ammunition wastewater. Application # 63/115,017.

PATENTS

1. Flory J, Fromme P, Vermaas W, Rittmann B, Torres C, Moore T, Moore A (February 18, 2020). Microbial Electro-Photosynthesis. US Patent no. 10,563,162.

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Spin-off Companies

1. Rittmann B, Zhou C, Lusk B (2020). Precient Technologies. Develop the MBfR technology for removing and recovering metals from contaminated waters. See [this article](#) on our website.

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Workshops (Hosted)

1. Boltz, J.P., Katz, L.E., Simm, R., Weijma, J., Lens, P. (2020). Biofilm reactors reduce selenium oxyanions in irrigated agriculture runoff, industrial and municipal wastewater. IWA Virtual Biofilms Conference, University of Notre Dame. Virtual event.
2. Gordon, K., Downing, L., Wadhawan, T., Faraj, R. van den Berg, L. Boltz, J.P. Schraa, O., Stewart, H. (2020). Biofilm modeling topics at the interface of research and application. IWA Virtual Biofilms Conference, University of Notre Dame. Virtual event.
3. Scholz, M. (2020 9 30). Phosphorus Forum 2020, Virtual. The Phosphorus Forum convenes stakeholders from across the phosphorus value chain for knowledge-sharing and networking.
4. Rao, Y., Hall, C., DiAngelis, L., and C. Morales-Yanez. Moving Beyond the Standard: A Transdisciplinary Virtual Event for Early-Career Scientists. American Geophysical Union Fall Meeting, December 2020. (Virtual due to COVID-19) Multi-part event to explore science communication, science policy, diversity, equity, inclusion, and justice, science art, and the impact of COVID on science. Developed by and for early career scientists.
5. Illingworth, S., and C. Hall. Rhyme Your Research. American Geophysical Union Fall Meeting, December 2020. (Virtual due to COVID-19) Workshop to train scientists to communicate science through non-traditional mediums, focusing on poetry and art.
6. Hall, C., Drost, N., Melsen, L., and T. van Emmerik. Open and FAIR Your Science. European Geoscience Union General Assembly, Vienna, Austria May 2020. (Virtual due to COVID-19) Panel discussion to discuss how to conduct open science, while addressing barriers and resources.
7. Illingworth, S., Hall, C., Soldati, A., and van Emmerik, T. Rhyme Your Research. European Geoscience Union General Assembly, Vienna, Austria May 2020. (Virtual due to COVID-19) Workshop to train scientists to communicate science through non-traditional mediums, focusing on poetry and art.
8. Hut, R., Hall, C., Solverova, A., and T. van Emmerik. Beyond the Metric: Communicating Your Research in Unconventional, but Media-Savvy, Units. European Geoscience Union General Assembly, Vienna, Austria May 2020. (Cancelled due to COVID-19) Workshop to explore communication in ways that the public can better understand (e.g., using an elephant to describe a weight rather than 1 ton).

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Summer Programs and Internships

1. Calvo Martinez, D.C. (2020). Catalina Pardo. Visiting Scholar from ASU to Uniandes. It was virtual due the pandemic but it was planned for Summer 2020.
2. Calvo Martinez, D.C. (2020). Salome Marin. Recommended Visiting Scholar from U. Manizales, Colombia to ASU. Coming in 2021.
3. Van Paassen, L. (2020) CBBG Summer RET program 2020, Center for Bio-mediated and Bio-Inspired Geotechnics, jean.larson@asu.edu
4. Rittmann, B, Lai, Y, Zheng, C. (2018-2020), Enhancing biodegradation of quaternary ammonium compounds (QAC). National Science Foundation
5. Davis, Taylor (2020 Jan 11). Data Science Internship, Versum Materials, Sam Wood (samuel.wood@versummaterials.com, 01/11/2020 - present)
6. Hall, C. (2020). Emergency Response Fellow, St. Vincent de Paul, Shawn Donnelly SDonnelly@svdpaz.org, June - December 2020.

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Courses Developed

1. Van Paassen, L (2020, Spring) CEE494/CEE598 Engineering Geology, students learn to recognize and classify rock and soil materials, to read and interpret geological maps, to apply structural geological techniques, to identify geological hazards, to interpret field and laboratory data, to plan and perform site investigations and extract the required parameters for a wide range of engineering applications.
2. Van Paassen, L. (2020, Fall) CEE351 Introduction to Geotechnical Engineering, students learn the basic principles of geotechnical engineering, including soil classification, engineering properties, compaction, groundwater flow, stress, deformation, consolidation, strength, bearing capacity, foundation and slope design, including a lab section
3. Van Paassen, L. (2020, Fall) CEE551 Advanced Geotechnical Testing, students learn the most common laboratory testing procedures and advanced testing protocols, including one-dimensional consolidation tests, Triaxial tests, Unsaturated soil tests, in-situ testing, and sampling.

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Popular Press Coverage

1. Calvo Martinez, Diana (2020) shares advice about how to deal with “research guilt” during a pandemic. Read the blog [HERE](#).
2. Marcus, A (2020). CNN: Using Work Cycles for research. <https://www.cnn.com/2020/10/19/world/work-gyms-spc-intl/index.html>
3. Davis, Taylor (2020). Taylor Davis's article got a nice coverage by Dr. Elizabeth Edwards from U Toronto in Journal of Nutrition. <https://academic.oup.com/jn/advance-article-abstract/doi/10.1093/jn/nxaa372/6039457>
4. Rittmann Lab MBfR technology is featured in Kelly, Caitlin. (2020, 4 28) "Engineers Tackle Water Shortages" <https://www.asme.org/topics-resources/content/engineers-tackle-water-shortages>
5. Lewis, C. (2020, May 14th) <https://asunow.asu.edu/20200514-cloth-masks-worthy-line-defense-mitigate-covid-19-pandemic>
6. Rangan, Srivatsan Mohana (2020) – ASU. <https://biodesign.asu.edu/news/microbial-remedies-target-chemical-threats-environment>
7. Rangan, Srivatsan Mohana (2020) – ASU. <https://asunow.asu.edu/20201117-microbial-remedies-target-chemical-threats-environment>
8. Rangan, Srivatsan Mohana (2020) - https://www.eurekalert.org/pub_releases/2020-11/asu-mrt111720.php
9. Rangan, Srivatsan Mohana (2020) - <https://www.sciencedaily.com/releases/2020/11/201117120722.htm>
10. Rangan, Srivatsan Mohana (2020) - <https://bioengineer.org/microbial-remedies-target-chemical-threats-in-the-environment/>
11. Rangan, Srivatsan Mohana (2020) - <https://scienmag.com/microbial-remedies-target-chemical-threats-in-the-environment/>
12. Rangan, Srivatsan Mohana (2020) - <https://phys.org/news/2020-11-microbial-remedies-chemical-threats-environment.html>
13. Rangan, Srivatsan Mohana (2020) - <https://www.news-medical.net/news/20201118/Researchers-explore-new-ways-to-rid-the-environment-of-co-occurring-toxic-chemicals.aspx>

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Collaborators

1. Diana Calvo Martinez
 - a. We established an international collaboration with Universidad Antonio Nariño (Colombia) and Pontificia Universidad Católica de Valparaíso (Chile) to develop a platform for bibliometric analysis applicable for different research projects. We currently have one manuscript in preparation with Dr. Hector Luna and Ms. Jineth Arango. I attended as a committee member for one of Dr. Luna's B.Sc. students.
 - b. We established a successful and key collaboration with the Georgia Institute of Technology for membrane synthesis with Dr. Ryan Lively and Ms. Hye Youn Jang.
 - c. We established a collaboration with Dr. Juan Manuel Cordovez from Uniandes and got a visiting scholar from ASU to his lab. Unfortunately, the pandemic did not allow her to travel, but we collaborated remotely.
 - d. We got additional funding from ASU LightWorks to explore the economics of the system and collaborate with Dr. Ellen Stechel, Dr. Ivan Ermanoski and Mr. Robert Stirling
 - e. We established collaboration with Dr. Manuel Rodriguez from Universidad de los Andes. I attended as a committee member for one of his M.Sc. students

- f. We established collaboration with Dr. Bruno Lobo from Universidade Federal de Ouro Preto. I attended as a committee member for one of his B.Sc. students
 - g. We are starting collaborations with Dr. Robert Nerenberg from University of Notre Dame, Mr. Quinten Mairén from U. of Gent, Dr. and Jaime Plazas and Dr. Johana Huserl from U. Andes, Colombia.
2. Justin Skinner,
 - a. Jacob Chu, Senior Executive, Haley and Aldrich, Microbial Inhibition, August 2020- Present
 3. Skanda Vishnu Sundar,
 - a. Natasha Sihota, Lead Environmental Engineer/Hydrogeologist: Chevron Energy Technology Company, Chevron Corporation, Apparent TPH in Non-contaminated soils, Aug 2019 - present.
 - b. Rachel Mohler, Team Leader, Feedstocks, Fuels, Base Oils and Additives at Chevron Technical Center, Apparent TPH in Non-contaminated soils, Aug 2019 - present.
 - c. Paul Dahlen, Assistant Research Professor, School of Sustainable Engineering and the Built Environment, Arizona State University, Apparent TPH in Non-contaminated soils, Aug 2019 - present.
 4. Yuhang Cai
 - a. Josh Boltz, Doctor, Biodesign Swette Center for Environmental Biotechnology, AnBfMBR, 10/04/19-03/28/21
 5. Rick Kupferer
 - a. Michelle Young, post-doctoral researcher,
 - b. Sam Utley, undergraduate research assistant,
 - c. Veronica Ayala, undergraduate research assistant,
 - d. Riley Tesman, undergraduate research assistant,
 - e. Austin Baker, undergraduate research assistant,
 - f. Swette Center,
 - g. Cities of Mesa and Tempe Food Waste to Energy Feasibility Study, 11/2019 - 5/2020.
 6. Andrew Marcus:
 - a. Elie Desmond-Le Quéméner, Research Scientist, INRAE, Univ Montpellier, LBE, 102 avenue des Etangs, 11100, Narbonne, France, Mathematical Modeling of Interspecies Electron Transfer
 - b. Roman Moscoviz, R&D project manager, SUEZ, Centre International de Recherche Sur l'Eau et l'Environnement (CIRSEE), Le Pecq, France, Mathematical Modeling of Interspecies Electron Transfer
 - c. Nicolas Bernet, Research Director, SUEZ, Centre International de Recherche Sur l'Eau et l'Environnement (CIRSEE), Le Pecq, France, Mathematical Modeling of Interspecies Electron Transfer
 - d. Steven Smith, Director, Translational Research Institute, AdventHealth, Orlando, FL, Human Bioenergetics Modeling
 7. YenJung Sean Lai
 - a. Kerry Hamilton, Assistant Professor, co-PI, NSF proposal submission, May 2020
 - b. Haiwei Gu, Assistant Professor, co-PI, NSF proposal submission
 8. Chen Zhou collaborated
 - a. Wong, Michael (Professor at Rice University) for a NSF-NEWT seed project "Defluorination of PFAS Using H₂-based Catalytic Membrane Reactor".
 9. Khemlal Nirmalakar,
 - a. James Adam, PhD, the Gut microbiome in Autism, ASU, Gut microbiome in the adult with autism, 2019-2020;
 - b. Qiyun Zhu, PhD, the Gut microbiome in Autism, ASU, Gut microbiome in children with autism, 2020/10/01.
 - c. Jonathan Krakoff, Diet and human gut microbiome, NIDDK, NIH, AZ, Impact of different diets in the human gut microbiome, 2019-2020
 10. Zachary Hubbard

- a. Leon Van Paassen, Geotechnical Engineering professor and co-advisor working on the Microbially Induced Iron Precipitation project.
11. Taylor Davis
- a. Shannon Parrington on a project measuring energy and COD of fecal samples. Shannon works as a researcher affiliated with National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The project began in the spring semester and is continuing into next year.

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New Analytical Capabilities

1. Appiah Nsiah G (2020, Fall) Environmental Engineering modelling
2. Brewer, PE (2020, spring). Eddy covariance of CH₄ and CO₂ surface emissions, LICOR training.
3. Calvo Martinez, D.C. (2020) Use of gas chromatography with FID detector. Trained by Sri
4. Calvo Martinez, D.C. (2020) Use of Agilent HPLC. Trained by Blake Dirks.
5. Calvo Martinez, D.C. (2020) Deeper Qiime2 analysis.
6. Calvo Martinez, D.C. (2020) Use of BLAST. Trained by Blake Dirks.
7. Dirks, B., (2019, Fall, 2020, Spring) Qiime2, R, PICRUSt2, qPCR
8. Edgar, M (2020, Fall). Ion Chromatograph maintenance and repair.
9. Eidi, Abdilwahab, AE (2019, Fall). Numerical Methods (MATLAB) in thermodynamics processes.
10. Eustance, E (2020). New Total Organic Carbon Analyzer. Teledyne Lotix.
11. Kupferer, R (2020). Developed new HPLC method to quantify 8 small fatty acids found in thickened sludge and anaerobic digester effluent
12. Levi, J (2020, Summer). Trained on ICP-MS analysis and am now able to complete it on my own.
13. Nirmalkar Khemlal, Bioinformatic analysis of gut microbiome for shotgun sequences (Woltka, CD-hit, Prodigal, microbial network) from online tutorials, Gut microbiome in Autism project
14. Pittman, S (2020, Fall). HPLC and Gas Chromatography graph analysis.
15. Rangan, SM (2020). Simultaneous quantification of anions using ion chromatography and suppressed ion conductivity.
16. Reep, J (2020 Spring), HPLC
17. Silverman, M (2020, Fall). In the short time I've been a part of the lab, I've been able to partake in bioremediation processes that I'd previously only learned about. As a result, I've learned how to analyze some of the measurements I've taken and have been able to connect the data with concepts and goals on a basic level. I'm excited to continue to learn and innovate, given the tremendous amount of resources provided at the lab.
18. Zheng, C (2020). Learned how to use LC-MS and its analysis

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New Pure and Mixed Microbial Metabolisms

1. Calvo Martinez, D.C. (2020). New Hyperthermophilic enrichments for syngas fermentation. Production of acids and alcohols from synthesis gas. Active in the 92 C oven, A 107.
2. Dirks, B., (2019, Fall, 2020, Spring) Methanobrevibacter Smitii pure cultures, methanogen pure culture, supplement bioreactor experiments, first floor -80C freezer.

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3. Long, X (2020). Not new culture. I have been cultivating magnetotactic bacteria since 2018, with the help of Yihao Luo, Chenwei Zheng and Dr. Chen Zhou. I grow them to synthesize biogenic magnetite nanoparticles and extract the nanoparticles for reactivity study.
 4. Skinner, J (Fall 2020) Mycobacterium Vaccae, TCE degrading pure culture, for experiments on aerobic TCE c-ometabolism, necropsy room.
 5. Skinner, J (Fall 2020) Soil-derived propane degrading culture, mixed culture for study of aerobic TCE c-ometabolism, necropsy room.
 6. Skinner, J (Fall 2020) Soil-derived butane degrading culture, mixed culture for study of aerobic TCE co-metabolism, necropsy room.
 7. Skinner, J (Fall 2020) Soil-derived acetylene degrading culture, mixed culture for study of aerobic TCE co-metabolism, necropsy room.

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Upscaled Bioprocesses

1. Van Paassen, L. (2020) Biogenic gas production for liquefaction mitigation through microbial denitrification, Meso-scale tank tests at ISTB-2 115, and field trials in Portland, Oregon.

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Sustainability Research and Practices

1. Leyva, C Created a portable, easy to install, battery or outlet powered water quality sensing unit with data logging capabilities for EPA project. Created a flow reactor to test sensing technologies that could be used to reduce water usage in drink bottle fill factories. Created website with up to date readings of 6 water quality measurements per floor of Biodesign C.

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Equipment Responsibilities

Members of our Center share responsibility for maintaining equipment and training others.

1. Alsanea, A (2020, Fall). Centrifuge: 1 hr per week (or less)
2. Calvo Martinez, D.C. (2020) Gas Chromatograph No 5. TCD detector. First semester: 10 hours per week. Second semester: 0.5 hours per week.
3. Crane, L (2020, Summer and Fall). TOC/TN Analyzer - 7 hours per two weeks. FIA - 3 hours per two weeks.
4. Davis, Taylor (2020, spring and fall) - freezer organization and maintenance. 1-5 hours per week.
5. Dirks, B., (2019, Fall, 2020, Spring) HPLC, time dedicated is variable Dirks, B., (2019, Fall, 2020, Spring) qPCR, time dedicated is variable Dirks, B., (2019, Fall, 2020, Spring) Clean room, dedicated time is variable
6. Edgar, M (2020, Fall). 3-5 hours per week maintaining ion chromatograph, TOC, UV/VIS Spectrophotometer, GC, and other analytical instruments in ECC 135.

7. Eustance, E (2020). ISTBV lab manager (4 hr/week). Lotix Total Organic Carbon Analyzer (2 hr/week). Labonco freeze-dryer (1 hr/week).
8. Kupferer, R (2019, all) care and maintenance of laser cutter, 2h/week
9. Lai, YJ (2015-2020). GC-FID #2
10. Long, M (2020). Receiving packages for the center and Hach DRB 200 Heater (2020)
11. Nirmalkar Khemlal, -80 freezer, 2020 whole year, for regular checkup (10min/week) & moving samples on emergency (4 hrs, one time), bioinformatic computer
12. Rangan, Srivatsan Mohana (2020). Anaerobic glove chamber, Fall 2020 and Spring 2021. 1 hour/week
13. Rangan, Srivatsan Mohana (2020). Cary Spectrophotometer, Fall 2020 and Spring 2021.
14. Reep, J (2020 Summer), ANKOM 2000
15. Skinner, J (2020, Fall). GC #5 TCD Maintenance and Training: 0-2 hrs per week
16. Skinner, J (2020, Fall). QPCR Maintenance and Training: 0-2 hrs per week
17. Van Paassen, L. (2020, Fall) Co-PI for the Center of Bio-mediated and Bio-inspired Geotechnics and Thrust leader on Environmental Protection and Restoration
18. Young, M. GC #5. (10 h/wk, Feb.-June) Young, M. Shimadzu HPLC backup owner. (< 1 h/wk, May-present) Young, M. Incubators/shaker tables. (2 h/wk, all year) Young, M. Hydrogen generator. (4 h/wk, March-May) Young, M. Receiving. (2.5 h/wk, all year) Young, M. Backup lab coordinator. (8 h/wk, all year) Young, M. Hach units. (1 h/wk, January-May)
19. Zheng, C, start PhD from Fall, 2018. I am the responsibility person for UPLC from Fall 2017 to Fall 2018. I spent about 2 hours per week to do the maintenance.

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Specialized Training

1. Calvo Martinez, D.C. (2020) The Science of Well-being. Yale University. Virtual course. For better practices to improve mental health and keep a good work-life balance.

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Testimonials

1. I am cultivating microbial cultures on multiple projects with the intent to derive microbial degradation capacity of PFAS compounds anaerobically and TCE through aerobic cometabolism. The Swette Center has provided me with an optimal learning environment where analytical capacity, technical expertise and friendly collaboration come to together to create consistent intellectual, professional and personal growth. **Justin Skinner, PhD Student, Delgado Lab**
2. I am privileged to be part of Cesar Torres's team and associated research workers specially M. Young, working on different aspects of Microbial Electro-chemical Cells. During one year of my stay I have learnt a great deal of expertise on different state of the art reactors that are fabricated to execute peroxide production and its further utilization for detoxification of aromatic compounds such as dyes and pesticides. Moreover, it's been highly amazing thought-provoking experience with contemporary researchers towards making ways for further innovation and practical implementation of the said technology. **Naeem Ali, PhD, Visiting Scholar**

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3. I began helping my mentor, Dr. Michelle Young, with her research this past summer, and I have greatly enjoyed my time as an undergraduate researcher. Not only do I learn techniques applicable to my future profession, I also gain knowledge applicable to my course work. Researching in the Swette Center has given my education purpose and direction, and for that I am incredibly grateful. **Smith Pittman, Undergraduate Researcher, Rittmann Lab**
 4. I feel very fortunate to be a part of the Swette Center as an undergrad and have gained invaluable information through my experiences here. I will be graduating in the spring, May 2021, with a BS in Molecular Bioscience and Biotechnology and a minor in Chinese. Volunteering in the center has allowed for me to sharpen my critical thinking and analysis skills, and I was fortunate enough to have the opportunity to pursue my Barrett thesis with my lab. In the upcoming semester, I will defend my thesis based on the research I've done on the saccharolytic and proteolytic potential of the human gut microbiome. This opportunity has been greatly beneficial to my learning, and I am happy to be a part of such a supportive team. **Rachel Klein, Undergraduate, Krajmalnik-Brown Lab**
 5. I am working on metagenomic analysis (shotgun) of gut microbiome in children with autism before and after microbiota transfer therapy (MTT) in Dr. Krajmalnik-Brown's lab. My main focus is to understand the functional role of gut microbiome in these children and identify the biomarkers for autism and MTT. Our autism-microbiome work makes us one of leading microbiome research group in autism field. In addition, I am also involved in another exciting microbiome project: Phase2 clinical trial in adults with autism, writing national and international grants. I am also working in multiple microbiome projects in collaboration with ASU and other institution NIDDK-NIH, Rensselaer Polytechnic Institute & Finch therapeutics. **Khemlal Nirmalkar, Postdoctoral Researcher, Dr. Krajmalnik-Brown's Lab**

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