

Impact Report

Biodesign Swette Center for Environmental Biotechnology in 2017

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January 30, 2018



January 01, 2017 – December 31, 2017

Swette Strategic Investment Fund - Annual Impact Report

The Biodesign Swette Center for Environmental Biotechnology (BSCEB) had a great 2017 that is laying the foundation for an even better 2018 and beyond. I take this opportunity to highlight the Center's achievements in 2017.

Mission

The Center's mission is to manage microbial communities that provide services to society. Many of the services make our society more environmentally sustainable: e.g., generating renewable resources and making polluted water and soil clean. The microbial services also make humans healthier – directly and indirectly. The Biodesign Swette Center is famous for its culture of cross-disciplinary and team-based research. This culture begins with our diverse set of researchers who come from many 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.



Leadership

The Center's leadership is provided by six tenure-track faculty and one research professor. New for 2017 is Dr. Anca Delgado ([Google Scholar Link](#)), an assistant professor in the School of Sustainable Engineering and the Built Environment (SSEBE). Dr. Delgado is an expert in bioremediation and the application of Molecular Microbial Ecology. Dr. Delgado joins these professors:

Bruce Rittmann^f, Center Director and Regents' Professor in SSEBE, [Google Scholar Link](#)

Rosa Krajmalnik-Brown^d, Associate Professor in SSEBE, [Google Scholar Link](#)

César Torres^g, Assoc. Prof., School of Energy, Matter, and Transport Engineering (SEMTE), [Google Scholar Link](#)

Treavor Boyer^a, Associate Professor in SSEBE, [Google Scholar Link](#)

Hinsby Cadillo-Quiroz^b, Assistant Professor in the School of Life Sciences (SoLS), [Google Scholar Link](#)

Andrew Marcus^e, Assistant Research Professor in BSCEB, [Google Scholar Link](#)



People

The total number of people working in the Center ranged from 85 to 100 people over the year. This includes graduate students, post-doctoral associates, undergraduate interns, high school interns, visiting scholars, and staff. New to the staff for 2017 is Sarah Arrowsmith, Laboratory Coordinator.

How does the Swette Strategic Investment Fund advance our success?

The most challenging part of doing research in leading-edge, inter-disciplinary topics (which is almost everything in BSCEB) is establishing the validity of a new topic and the capability of its researchers. This is needed to get external funders to accept the idea and be willing to consider funding it. The Swette Strategic Investment Fund allows us to develop preliminary results, publish seminal papers, give breathtaking talks, and have time to write proposals. BSCEB has the flexibility to recruit outstanding researchers, integrate them with the core of the BSCEB team, help all of us start new areas, and keep everyone going until external support can be attained.

Over the years, we have used the Swette funds to do all of these things. The topics on which we focus shift from year to year, but the strategy remains in place. For example, in past years we supported new efforts in the human intestinal microbiome. This paid off with a nearly \$4-million grant from NIH and a \$1.3-million grant from DoD. We also invested in our microbial photobioenergy team, and this led to a \$1-million grant from the DoE. We continue to invest in the microbial photobioenergy area, because we have excellent ideas for how to greatly enhance the productivity of those systems.

The investment also put us in a position to lead large ASU efforts. For example, we are at the lead in three DECISIVE white papers, the [Future H₂O Initiative](#), the [Morocco/UM6P Initiative](#), and the initiative for a large water center in cooperation with [Ben-Gurion University](#).

We thank the Swette family for its generous support. We are pleased to provide this report that highlights notable activities and impacts in 2017. It begins with Highlights for 2017 and then identifies the major impacts our work is having. Finally, an Appendix lists all the detailed information that underlies the highlights and impacts.

Highlights for 2017

Here are the Center's highlight achievements in categories of Research Activities and Outputs, Mentoring Activities, Special Activities and Impacts, and Awards and Accolades, and Alumni Success. The Appendix provides all the details, and you can keep up with BSCEB by visiting our website <http://www.environmentalbiotechnology.org/> to read Center [NEWS](#), [BLOGS](#), and [SAFETY UPDATES](#).

Research Activities and Outputs

- 76** papers published. These include an invited paper by Dr. Rittmann in the 60th-anniversary issue of *J. Environmental Engineering* ("Ironies of Microbial Electrochemistry), a Biodesign-recognized high impact paper by Sean Lai and colleagues ("How myristyltrimethylammonium bromide enhances biomass harvesting and pigments extraction from *Synechocystis* sp. PCC 6803" in *Water Research*), and a nationally and internationally publicized paper by Dr. Krajmalnik-Brown's team ("Microbiota transfer therapy alters gut ecosystem and improves gastrointestinal and autisms symptoms: an open-label study" in *Microbiome*.)
- 90** presentations at conferences, universities, and other research laboratories, including the Perry L. McCarty lecture at Stanford University and the Zhu Kezhen Lectures at Zhejiang University by Dr. Rittmann.
- 2** patents issued and **1** patent licensed.
- 40** externally funded research projects from **5** US Federal agencies (NSF, NIH, DoE, DoD, and NASA), foundations, industries, and foreign agencies.

Mentoring Activities

11 degrees earned: **2** PhDs, **3** Masters, and **8** Bachelors
39 graduate students, **7** post-doctoral associates, and **5** research scientists
29 undergraduates, including **4** Swette Undergraduate Sustainability Interns and **5** FURI Scholars
11 visiting scholars
1 high school student and **3** teachers
4 volunteer researchers

Special Activities

Leadership to the Biodesign United Way campaign, where the Center had 95% participation.
Leadership for Biodesign's Night of the Open Door (about 2,800 visitors), Chief Science Officers Event at Biodesign for high-school science leaders, and Chalk Talk series.
Leadership and participation (4 Center members) teaching biology in the Arizona prison in Henderson.
Hosting the Sustainable Phosphorus Alliance (Matthew Scholz, Executive Director)
Dr. Krajmalnik-Brown was selected for a blue-ribbon panel of the National Academies Committee on Advancing Understanding of the Implications of Environmental-Chemical Interactions with the Human Microbiome.
Drs. Krajmalnik-Brown and Marcus traveled to Israel as part of a collaboration with Ben Gurion University.
Dr. Torres was voted to the Board of Directors for the International Society for Microbial Electrochemistry and Technology.

Awards and Accolades

27 awards to **18** individuals, including:


- **5** Dean's Fellowships from the Fulton Schools of Engineering
- **2** best-paper winners
- **5** travel grants
- the Innovation Award for Best Technological Advancement for 2017 from the International Society for Microbial Electrochemistry and Technology (Dongwon KI)
- election as a Fellow of the National Academy of Inventors and of the Association of Environmental Engineering and Science Professors (Dr. Rittmann)
- the Daniel Jankowski Legacy Award from the Ira A. Fulton Schools of Engineering (Dr. Rittmann)

Alumni Success

All of our alumni are successful, but one special measure is the number of PhD and post-doc alumni who are now tenured or tenure-track professors at major universities around the world. These include: Hyung-Sool Lee, Assoc. Prof. at U. Waterloo, Ontario; César Torres, Assoc. Prof. at ASU; Rosa Krajmalnik-Brown, Assoc. Prof. at ASU; Michael Marsolek, Assoc. Prof. at U. Seattle; He-Ping Zhao, Assoc. Prof. at Zhejiang U in Hangzhou, China, Youneng Tang, Asst. Prof. at Florida State U.; Sudeep Popat, Asst. Prof. at Clemson University; Onar Apul, Asst. Prof. at U. Massachusetts, Amherst; Prathap Parameswaran, Asst. Prof. at Kansas State U., and Anca Delgado, Asst. Prof. at ASU.

Sustainability Impacts

BSCEB is a major international player for finding ways to make human society more sustainable. Our research, technologies, and people are the driving forces for improving environmental quality, creating truly renewable resources, and helping humans be healthier. How do we know that we are having these positive impacts?



Some of the impacts occur primarily within the academia and are readily tabulated: e.g., our **76** publications, **40** research grants, **27** awards, and long list of super-successful alumni.

Other impacts are less readily tabulated, but have long-lasting benefits: e.g., teaching biology in the prisons, involving undergraduates and high-schools in research about environmental biotechnology, and being a magnet for international visiting scientists and research collaborator.

Finally, our work is leading to technological advances that help society move towards better sustainability in each of our themes. For example, BSCEB research established that fecal transplants can help those in the autism spectrum interact better with their families and colleagues. We demonstrated that the membrane biofilm reactor can convert toxic metals in mining wastewaters into highly valuable nanoparticles. And, we are scaling up microbial electrochemical cells to provide energy-neutral wastewater treatment for groups of 50 to 500 people in remote areas.

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New Faculty/Staff

[Anca Delgado](#) joined BSCEB and SSEBE as a faculty member in August of 2017. Her research focuses on soil and water microbial processes that sequester, recycle, and transform carbon and chlorine compounds for (i) contaminant removal, (ii) minimization of harmful chemicals in food production, (iii) improvement of soil quality, and (iv) biofuel precursor production. Delgado has spent her entire academic career at ASU, most recently completing a postdoctoral fellowship in environmental engineering. During her postdoctoral appointment, Delgado studied strategies for enhanced bioremediation by combining biodegradation and chemical oxidants for remediating soils contaminated heavy petroleum hydrocarbons. Prior to that, she received a Ph.D. in Microbiology in 2013 and B.S. in Microbiology in 2008 at ASU.



Sarah Arrowsmith joined BSCEB as the Laboratory Coordinator in June 2017. Sarah has a Bachelor of Science in Biology from Elmira College, in New York and a Masters in Agribusiness from the W.P. Carey School of Business at A.S.U. She was originally hired as a Research Specialist on one of our soil bioremediation projects, and then applied to replace our Lab Manager when she retired. Sarah has experience in a large facility that produced products from algae and is an expert in ICP-OES, GC-FID/MS, and other analytical equipment usage and maintenance. Sarah acts as our Center Safety Compliance Officer in addition to her laboratory coordination duties.



New Teaching Programs

Dr. Boyer led the formation and approval of the new BS degree in Environmental Engineering. It was approved by the Board of Regents and began in Fall 2017. Other faculty participating in the implementation of the new program are Professors Rittmann, Krajmalnik-Brown, and Delgado.

Research Activities and Outputs

Funded Research

Faculty in BSCEB have been very successful leveraging the Swette Strategic Investment to obtain new research projects, including a number of large awards. Major new projects are listed here.

Sponsor	Principal Investigator	Title and Award Amount
DOD-ARMY-USAMRAA W81XWH-16-1-0492 (9/1/16-8/31/20)	PI Adams co-PI Krajmalnik-Brown	<i>Treating gastrointestinal and autism symptoms in adults with autism using Microbiota Transfer Therapy (MTT), \$ 1,293,794</i>
ASU Foundation, 30007312	PI Adams, co-PI Krajmalnik-Brown	<i>Long-term Follow-up on Beneficial Bacteria Treatment Study, \$28,008</i>
NSF-ENG-CBET, CAREER 1713704 (7/15/2016 - 12/31/2018)	PI Boyer	<i>Sustainable Urine Processes through integration of Education and Research, \$156,627</i>
NASA-GODDARD SPACE FLIGHT CTR NNX15AD53G (12/31/14-12/30/19)	co-PI Cadillo-Quiroz	<i>Exoplanetary Ecosystems: Exploring Life's Detectability on Chemically Diverse Exoplanets, \$6,097,436</i>
NSF-GEO-OCE 1658527 (3/15/17-2/29/20)	co-PI Cadillo-Quiroz	<i>Aggregation of Marine Picoplankton, \$687,521.00</i>
NSF-BIO-DEB 1355066 (5/1/14-4/30/19)	PI Cadillo-Quiroz	<i>Collaborative Research: Forest productivity and hydrological patterns regulate methane fluxes from peatlands in the Amazon basin, \$626,999.00</i>
NSF-BIO-DEB 1637590 (12/1/16-11/30/18)	co-PI Cadillo-Quiroz	<i>LTER CAP IV: Design with Nature, \$4,508,000</i>
Phoenix/Scottsdale Groundwater Contamination Endowment ASUF (1/1/17-12/31/17)	PI Delgado co-PI Krajmalnik-Brown	<i>ZVI-Mediated Reductions of Chlorinated Compounds: Fundamental Understanding and Strategies for Bioremediation, PI Delgado, Co-PI Krajmalnik-Brown, Amount \$49,000</i>
CHEVRON ENERY & TECH. CORP CW1022841/14072019 (1/27/14-6/30/18)	PI Johnson co-PIs Delgado, Krajmalnik-Brown, Rittmann	<i>In-Situ Remediation of Heavy Hydrocarbons in Impacted Vadose Zone Soils: Strategy and Management Approach for Innovation, Chevron Energy and Technology Company, \$2,075,233</i>
National Science Foundation, NSF-ENG-EEC 1449501 (08/01/17-07/31/18)	PI Kavazanjian, Co-PIs Krajmalnik-Brown, Torres, Rittmann, Boyer, Cadillo-Quiroz	<i>Center for Bio-mediated and Bio-inspired Geotechnics, \$18-million;</i>
National Institutes of Health, HHS-NIH 1R01DK105829-01A1	PI Krajmalnik-Brown, co-PIs Rittmann, Marcus	<i>Integrating Quantitative Energetics Determines the Microbiomes Contribution to Energy Balance, \$3,936,800</i>
Mayo Clinic Arizona ARI-225822 (3/1/17-8/31/18)	co-PI Krajmalnik-Brown	<i>Obesity in Menopause: The role of estrogen therapy on the gut microbiome and host, \$50,000</i>
Department of Energy, DOE DE-EE0007562 (10/1/16-9/30/18)	PI Lammers, co-PI Krajmalnik-Brown	<i>A novel platform for algal biomass production using cellulosic mixotrophy, \$1,689,791</i>
Department of Energy, DOE-EERE DE-EE0007093	PI Rittmann,	<i>Atmospheric CO2 Capture and Membrane Delivery, \$1 million</i>

Sponsor	Principal Investigator	Title and Award Amount
National Science Foundation, NSF-ENG 1509933	PI Rittmann	<i>Targeted saturated fatty acids synthesis by microbial biohydrogenation and its superior extraction from microalgae biomass through fermentation, \$309,443</i>
National Science Foundation, NSF-ENG 1702445 (2017-2020)	PI Rittmann	<i>Enhancing Biodegradation of Quaternary Ammonium Compounds (QAC), \$329,738</i>
Lightworks – FY18	PI Rittmann	<i>Growth conditions affecting biomass competition for calcifying <i>Emiliana huxleyi</i> in a direct membrane-carbonation photobioreactor, \$13,046</i>
Lightwork – FY17	PI Rittmann	<i>Integration of cationic surfactant for harvesting and lipid extraction on microalga biomass, \$20,000</i>
GIOS –FY18	PI Rittmann Co-PIs Krajmalnik-Brown, Torres, Marcus, Boyer, Cadillo-Quiroz	<i>Swette Undergraduate Scholar Fund</i>
Department of Defense, DOD-SERDP W912HQ-17-C-0013 (04/01/17-04/05/18)	PI Rittmann co-PI Krajmalnik-Brown	<i>Synergistic Reductive Dechlorination of 111-Trichloroethane and Trichloroethene, \$200,000</i>
National Science Foundation, NSF-ENG 1603656	PI Rittmann, co-PI Torres	<i>Engineering the Hollow-Fiber Membrane Biofilm Reactor to Convert Syngas to Valuable Products, \$209,022</i>
Department of Defense, DOD-NAVY-ONR N00014-15-1-2702 (9/1/15-10/31/18)	PI Torres co-PI Krajmalnik-Brown	<i>Combining Electrochemical -Omics and Microscopic Approaches to Characterize Transport Limitations in Anode-Respiring Bacteria Biofilms, \$448,955</i>
Department of Defense, DOD-NAVY-ONR N00014-15-1-2571 (05/01/15-04/30/18)	PI Torres	<i>Development of Substrate-loaded Microbial Fuel Cells for Powering Remote Sensors, \$399,775</i>
NSF-EHR-DGE 1144616 (07/01/12-06/30/18)	PI Vermaas co-PI Torrrres	<i>IGERT: Solar Utilization Network (SUN), \$3,006,642</i>
NSF-BIO-DBI 1531991 (09/01/15-08/31/18)	PI Spence Co-PI Torres	<i>MRI: Acquisition of Cryo-EM for Southwest Regional Center, \$2,825,509</i>
DOD-SERDP (09/28/12-09/28/17)	PI Torres	<i>Wastewater Treatment Using Microbial Fuel Cells with Peroxide Production, \$1,687,607</i>
Center for Applied Structural Discovery Start-Up – FY18	PI Fromme co-PI Torres	<i>Microbial Electro-Photosynthesis (MEPS)</i>

Papers Published or Accepted in 2017 (current BSCEB members in boldface)

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- Rittmann, B. E.** Ironies of microbial electrochemistry (2017). *J. Environ. Engr.* 143(5): 03117001, pages 1 - 7 (DOI: 10.1061/(ASCE)EE.1943-7870.0001202).
- Saetta, D., Boyer, T.H.**, 2017. Mimicking and inhibiting urea hydrolysis in nonwater urinals. *Environmental Science & Technology*, 51(23), 13850–13858. <http://dx.doi.org/10.1021/acs.est.7b03571>.
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- Straka L, Rittmann BE.** 2017. Effect of Culture Density on Biomass Production and Light Utilization Efficiency of *Synechocystis* sp. PCC 6803. *Biotechnol. Bioeng.* Accepted. DOI 10.1002/bit.26479
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- Zhou, D., Dong, S., Shi, J., Cui, X., **Ki, D., Torres, C.I., Rittmann, B.E.**, 2017. Intimate coupling of N-doped TiO₂ photocatalyst and anode respiring bacteria for enhancing 4-chlorophenol degradation and current generation. *Chemical Engineering Journal*, 317, 882-889.
- Zhou, C, Wang Z, Marcus AK, and Rittmann BE** (2017). Biofilm-Enhanced Continuous Synthesis and Stabilization of Palladium Nanoparticles (PdNPs). *Environ Sci Technol.* 3: 1396-1404. Investigates the effects of bariatric surgery and environmental conditions (e.g., pH) on the microbial community structure and functions in our colon.
- Zhou, C.**, Z. Wang, A. Ontiveros-Valencia, **M. Long**, S. Xia, and **B. E. Rittmann** (2017). Coupling of Pd nanoparticles and denitrifying biofilm promotes H₂-based nitrate removal with greater selectivity towards N₂. *Appl. Catalysis B: Environment* 206: 461-470.
- Zhou, C., Y. Zhou**, and **B. E. Rittmann** (2017). Reductive precipitation of sulfate and soluble Fe(III) by *Desulfovibrio vulgaris*: electron donor regulates intracellular electron flow and nano-FeS crystallization. *Water Research* 119: 91-101.
- Zhou, C.; Zhou, Y.; Rittmann, B.E.** 2017. Electron donor regulates electron flow for dissimilatory sulfate and Fe(III) reductions and biogenic iron-sulfide crystallization with *Desulfovibrio vulgaris*. *Water Research*, 119:91-101.
- Zhou Y, Lai YS, Eustance E, Straka L, Zhou C, Xia S, Rittmann BE.** 2017. How myristyltrimethylammonium bromide enhances biomass harvesting and pigments extraction from *Synechocystis* sp. PCC 6803. *Water Research* 126 (Supplement C):189-196.
- Zhou Y, Nguyen B, Lai YS, Zhou C, Xia S, Rittmann Y BE.** 2016 Using flow cytometry to evaluate thermal extraction of EPS from *Synechocystis* sp. PCC 6803. *Algal Research* 20:276-281.

- Zhou Y, Eustance E, Straka L, Lai YS, Xia S, Rittmann BE.** 2017. Quantification of heterotrophic bacteria during the growth of *Synechocystis* sp. PCC 6803 using fluorescence activated cell sorting and microscopy (minor revision submitted to *Algal Research*).
- Zhou, Y.; Nguyen, B.T.; Zhou, C.; Straka, L.; Lai, Y.S.; Xia, S.; Rittmann, B.E.,** 2017. The distribution of phosphorus and its transformations during batch growth of *Synechocystis*. *Water Research*, 122:355-362.
- Zhou, Y.;** Zhang, J.; Zhang, Z.; **Zhou, C.; Lai, Y.S.;** Xia, S. 2017. Enhanced performance of short-time aerobic digestion for waste activated sludge under the presence of cocoamidopropyl betaine. *Chemical Engineering Journal*, 320: 494–500.

Conference Proceedings and Presentations (presenter in bold)

- Altizer, M.** "Measuring Biotic Soil Hydrogen Demand as a Strategy for Bioremediation Potential Assessment" for the Battelle conference and "Tracking Hydrogen Flux in Soils to Improve Bioremediation Potential Site Assessments." Battelle Bioremediation Conference 2017 and American Environmental Engineering & Science Professors Conference 2017
- Altizer M, Luna-Aguero M, **Delgado AG**, Torres CI, Krajmalnik-Brown R. Tracking hydrogen flux in soils to improve bioremediation potential site assessments. AEESP Research and Education Conference, Ann Arbor, MI, June 2017.
- Altizer M, Luna-Aguero M, **Delgado AG**, Torres CI, Krajmalnik-Brown R. Measuring biotic soil hydrogen demand as a strategy for bioremediation potential assessment. Battelle Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, FL, May 2017.
- Altizer M, **Delgado AG**, Torres CI, Krajmalnik-Brown R. Follow the electrons: understanding the subsurface hydrogen flux. 56th Annual Meeting of the Arizona-Nevada Branch of the American Society for Microbiology, Tucson, AZ, April 2017.
- Boyer, T.H.,** 2017. Life Cycle Comparison of Urine Source Separation and Centralized Wastewater Treatment. Presented at AZ Water Association Building our Sustainable Water Future, Tempe, Arizona, 10 January 2017.
- Boyer, T.H., 2017. Alternative Ion Exchange Using Bicarbonate And Potassium Counterions. Presented at AWWA 2017 International Symposium on Inorganics, Detroit, Michigan, 21–22 March 2017.
- Boyer, T.H.,** 2017. Life cycle comparison of urine source separation and centralized wastewater treatment. Presented at 253rd American Chemical Society National Meeting & Exposition, San Francisco, California, 2–6 April 2017.
- Boyer, T.H.,** 2017. Life Cycle Comparison of Urine Source Separation and Centralized Wastewater Treatment. Presented at AZ Water Association 90th Annual Conference & Exhibition, Phoenix, Arizona, 3–5 May 2017.
- Boyer, T.H.,** 2017. Pilot scale evaluation of combined ion exchange for simultaneous removal of multiple drinking water contaminants. Presented at AEESP 2017 Research and Education Conference, University of Michigan, Ann Arbor, Michigan, 20–22 June 2017.
- Cecillon S, Vogel TM, Altizer M, **Delgado AG**, Krajmalnik-Brown R. Dehalococcoides social networks in chlorinated solvent environments. Battelle Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, FL, May 2017.
- Chan, N.I.** 2017, Invited talk at the American Scientific Affiliation at ASU on Phosphorus Sustainability
- Chen T,** Delgado AG, Yavuz BM, Maldonado J, Zuo Y, Kamath R, Westerhoff P, Krajmalnik-Brown R, Rittmann BE. Interpreting interactions between ozone and residual petroleum hydrocarbons in soil. Battelle Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies, Miami, FL, May 2017.
- Delgado AG,** Fajardo-Williams D, Bondank E, Esquivel-Elizondo S, Krajmalnik-Brown R. Coupling bioflocculation of *Dehalococcoides mccartyi* to high-rate reductive dehalogenation of chlorinated ethenes. SERDP & ESTCP Symposium, Washington DC, November 2017.
- Delgado AG,** Apul OG, Chen T, Yavuz BM, Rittmann BE, Westerhoff P, Krajmalnik-Brown R. Lifting the weight off crude oils- potentials and limitations of chemical oxidation and biodegradation in contaminated soils. AEESP Research and Education Conference, Ann Arbor, MI, June 2017.

- Dirks, B.**, 2017. Effects of Resistant Starch and Methanogens on Fermentation and Community Composition. The American Society for Microbiology 2017 Microbe conference and the ASU Microbiology/MCB Graduate Programs Joint Annual Retreat
- Esquivel-Elizondo, S.**, Howells, A., Calvo, D., Shock, E., and Krajmalnik-Brown, R. October 2017. "Microbial Metabolic Reactions under Extreme Alkaline Conditions." (Oral presentation) CBBG Annual Meeting, Tempe, AZ.
- Esquivel-Elizondo, S.**, Howells, A., Calvo, D., Shock, E., and Krajmalnik-Brown, R. August 2017. "Anaerobic Carbon Monoxide Oxidizers in Oceans, Lake and Volcanic Sediments, and High-pH Environments." Multi-Omics for Microbiomes conference. Pasco, WA.
- Esquivel-Elizondo, S.**, Delgado, A.G., Krajmalnik-Brown, R. April 2017. "Syngas fermentation: Acetate and Ethanol Production by Pure and Mixed-Cultures Enriched with Carbon Monoxide." 56th AZ/Southern NV Regional ASM Meeting. Tucson, AZ.
- Esquivel-Elizondo, S.** and Krajmalnik-Brown, R. April 2017, "Microbial Metabolic Exploration" (Oral presentation) CBBG Mid-Year Meeting, Davis, CA.
- Everett Eustance**, YenJung Sean Lai, Tarun Shesh, Bruce Rittmann, 2017. Utilization of Membrane Carbonation in Algal Cultivation to Improve Carbon Capture Efficiency. Algae Biomass Summit 2017. Salt Lake City, UT.
- Finn, D.**, Catton, K., Heenan, M., Kopittke, P., Cadillo, H., Ouwkerk, D., Klieve, A., Dalal, R.C. 2017. Differential gene expression in the model Actinomycete *Streptomyces coelicolor* A3(2) during soil organic carbon priming. 6th International symposium on soil organic matter, 3-7 September 2017, Rothamstead Research, Harpenden, UK.
- Hall, C.**, Gabby Hernandez, Kathleen Darby, Leon van Paassen, Edward Kavazanjian, Jason DeJong, and Dan Wilson. Centrifuge Model Testing of Liquefaction Mitigation via Denitrification-Induced Desaturation*. Geotechnical Earthquake Engineering and Soil Dynamics V (GEESD V), Austin, TX, June, 2018.
- Hall, C.**, Leon van Paassen, Edward Kavazanjian, Jason DeJong, Dan Wilson. Evaluation of Biogenic Gas Formation by Denitrification in Centrifuge*. 7th International Conference on Unsaturated Soils (UNSAT 2018). Hong Kong, China, August 2018.
- Hall, C.**, Dec 2017 American Geophysical Union Fall Meeting, New Orleans, LA, Characterization of Biogenic Gas and Mineral Precipitation by Denitrification in Porous Media.
- Hall, C.**, Apr 2017 2nd Mid-Year Meeting for CBBG, Davis, CA, Bursting Bubbles: MIDP via Denitrification Centrifuge.
- Hall, C.**, Mar 2017 Geotechnical Frontiers 2017, Orlando, FL, A Biogeochemical Model for Soil Improvement by Denitrification.
- Hernandez, G., Kathleen Darby, **Caitlyn Hall**, Daniel Wilson, Ross Boulanger, Jason DeJong, Leon van Paassen, Edward Kavazanjian. Centrifuge Model Testing of Liquefaction Mitigation by Microbially Induced Calcite Precipitation*. Geotechnical Earthquake Engineering and Soil Dynamics V (GEESD V), Austin, TX, June, 2018.
- van Paassen, L, Vinh Pham, Nariman Mahabadi, **Caitlyn Hall**, Elizabeth Stallings, and Edward Kavazanjian. Biogenic gas formation as ground improvement technique. 2nd Pan American Conference on Unsaturated Soils (Pan-Am UNSAT 2017), Dallas, TX, November 2017.
- Kang, D. -W.**, Adams, J. B., Khoruts, A., Maldonado, J., McDonough-Means, S., Pollard, E. L., Sadowsky, M. J., Schwarzberg Lipson, K., Caporaso, J. G., and Krajmalnik-Brown, R. (2017) "Fecal Microbiota Transplant Improves Gastrointestinal and Autism Symptoms by Changing the Gut Bacterial Community and Fecal Metabolites" Oral presentation at American Society for Microbiology conference (ASM Microbe 2017), June 1-5, 2017, New Orleans, Louisiana.
- Kang, D. -W.**, "Multi-omics approach to study gut microbiome and autism"; the seminar at the center for Fundamental Applied and Microbiome (MIC591) on March 2017
- Kang, D. -W.**, "Multi-omics approach to study gut microbiome and autism (II)" the seminar at the center for Fundamental Applied and Microbiome (MIC591) on November 2017
- Ki, Dongwon**, Sudeep C. Papat, Rick Kupferer III, Bruce E. Rittmann, César I. Torres. Microbial hydrogen peroxide producing cells (MPPCs) fed with primary sludge. AEESP, June, 2017.

Lai YS, Zhou Y, Rittmann BE., 2017. Synergistic integration of C12 to C16 cationic surfactants for flocculation and lipid extraction from *Chlorella* and *Scenedesmus* biomass. Algal Biomass Biofuels & Bioproducts 7th International Conference, Miami, FL, June 18-21, 2017.

Lusk, B.

1. National Cave and Karst Management Symposium
2. <https://www.sciencetheearth.com/> presentations
3. Jan.6: HUST, Hanoi, VT
4. Jan 11: NTU, Singapore, SG
5. Jan 20: University of Queensland, Brisbane, AU
6. Feb 1: University of Auckland, Auckland, NZ
7. Mar 14: Universidad Antonio Nariño - Bogotá, CO
8. Mar 17: Los Andes University, Bogotá, CO
9. Apr 20: U.S. Naval Research Lab, Washington, DC
10. Apr 24: Arizona State University, Tempe, AZ
11. May 9: Ocotillo Elementary, Phoenix, AZ
12. May 18: USC, Los Angeles, CA
13. June 28: Washington State University, Pullman, WA
14. July 6: Kansas State University, Manhattan, KS
15. July 10: University of Notre Dame, Notre Dame, IN
16. July 19: Harvard University, Cambridge, MA
17. July 25: Penn State, State College, PA
18. Nov 19: Humanist Society, Mesa, AZ
19. Science in a Cave at GCC, Peach Springs, AZ

Reynolds, M.C., Debbie Chang, Jaqueline Winston, Rosa Krajmalnik-Brown, and Hinsby Cadillo-Quiroz. "Optimization of Solid Waste Biomethanation using Hydrogen produced via MnO oxidation". Poster presentation at ISWA World Congress and WasteCON. September 2017.

Rittmann, B.E.

1. February 9 – From treatment to resource. University of Nevada, Reno, NV
2. March 8 – Atmospheric CO₂ Enrichment and Delivery (ACED). DoE Annual Review Meeting, Denver, CO
3. March 15 – New opportunities with biofilm processes. University of Toronto, Toronto, Ontario
4. March 20 – Environmental biotechnology and microbial electrochemistry. Biodesign Institute Chalk Talk
5. March 21 – Mentoring panel. Biodesign Institute Inspire! Series
6. March 29 – From treatment to resource. Invited lecture at the “From Waste to Resource” International Conference, King Abdullah University of Science and Technology, Saudi Arabia
7. April 17 – Ironies of microbial electrochemistry. Perry L. McCarty Distinguished Lecture, Stanford University, Stanford, CA
8. May 8 – The value proposition for sustainable phosphorus. Keynote address at the 4th International Symposium on Innovation and Technology in the Phosphate Industry, Marrakech, Morocco
9. May 17 – The value proposition for sustainable phosphorus. Sustainable Phosphorus Research Coordination Network Annual Meeting, Washington, DC
10. June 1 – Maximizing resource recovery from wastewater. Leading Edge Technology Conference, International Water Association, Florianopolis, Brazil
11. June 5 – Opportunities in microbial bioenergy. Pontificio Universidad Catolica del Peru, Lima, Peru
12. June 6 – From treatment to resource. Pontificio Universidad Catolica del Peru, Lima Peru.
13. June 29 – The ARBsource story. Leading Edge Technology Conference, International Water Association, Florianopolis, Brazil
14. August 3 – The BIG picture of energy options. Spirit of the Senses, Biodesign Institute.
15. August 9 – Maximizing resource recovery from wastewater. Keynote address at the 2nd International Resource Recovery Conference, International Water Association, Columbia University, New York City
16. September 11 – Ironies of microbial electrochemistry. Washington State University, Pullman, WA.
17. October 9 – Making research meet practice in environmental biotechnology. NAU, Flagstaff, AZ
18. October 11 – Opportunities in microbial bioenergy, FSE 150, Amy Trowbridge (instructor), Tempe campus.
19. October 17 – Maximizing the value of resources recovered from wastewater. IWA Anaerobic Digestion Conference 2017, Beijing, China.
20. October 20 – The microorganisms always close the mass balance. IWA Anaerobic Digestions Conference 2017, Beijing, China
21. October 22 – Prying open the black box. Conf. of the Chinese Society for Microbial Ecology, Beijing, China

22. October 24 – Opportunities in microbial bioenergy, Zhu Kezhen Distinguished Lecture, Zhejiang University, Hangzhou, China
 23. October 25 – Understanding the biofilm anode in microbial electrochemical cells, Zhu Kezhen Distinguished Lecture, Zhejiang University, Hangzhou, China
 24. October 27 – Ironies of microbial electrochemistry, Tongji University, Shanghai, China
 25. October 28 – Opportunities in microbial bioenergy, Dalian University of Technology, Dalian, China
 26. October 29 – Microbial products in environmental biotechnologies, Dalian University of Technology, Dalian, China
 27. October 30 – Ironies of microbial electrochemistry, Shanghai Normal University, Shanghai, China
- Saetta, D.**, 2017. Urea hydrolysis inhibition in waterless urinals for water conservation and nutrient recovery (presentation) at the 2017 American Chemical Society National Conference.
- Saetta, D.**, 2017. Urea hydrolysis inhibition in waterless urinals for water conservation and nutrient recovery (presentation) at the 2017 Arizona Water Annual Conference.
- Saetta, D.**, 2017. Mimicking and inhibiting urea hydrolysis in nonwater urinals (poster) at the 2017 Association of Environmental Engineering and Science Professors Research Conference.
- Saetta, D.**, 2017. Urine the cloud: Real-time sensing of nonwater urinal for urine diversion systems and water conservation (poster) at the 2017 IEEE Sustech Conference
- Sarno, A.**, Humphreys, E., Olefeldt, D., Heffernan, L., Kolka, R., Roman, T., Sebestyen, S., Yavitt, J., Finn, D., Cadillo-Quiroz, H. Poster presentation, AGU 2017 Fall meeting. Microbial communities and methane production From Northern Peatlands Across a Climate Gradient.
- Martinez A, Sabrowsky S, Yin K, Smith C, Hendrix V, Spring J, Ramirez Z, Le S, Sochor P, Layton S, Kassis A, Curl D, Djokic, Angeles E, Flores J, **Sarno A.F.**, Cadillo-Quiroz H. Poster presentation, ABRCMS 2017. Isolation and Characterization of novel Heterotrophic Bacteria from Amazon Peatlands: An Inquiry Based Learning Effort.
- Wik, B.**, 2017. Predicting the impact of recycling water and nutrients on the growth of algae via a mathematical model. Poster competition at AZWater conference in May 2017.
- Wik, B.**, 2017. Employing the Entrepreneurial Mindset at WEFTEC in Chicago, IL. WEFTEC Chicago in September 2017
- Zhou, C.** Biofilm enhanced nano-Pd recovery from waste stream and Pd-catalytic denitrification. 2nd International Young Scientist Forum on Frontiers. in Environmental Science & Engineering at Tongji University, Shanghai, China, May 19-20, 2017
- Zhou, C.**; Wang, Z.; Rittmann, B.E. Coupling of Pd nanoparticles and denitrifying biofilm promotes H₂-based nitrate removal with greater selectivity towards N₂. 253rd American Chemistry Society (ACS) National Meeting, San Francisco, California, April 2-6, 2017

Patents Issued or Licensed (current members in boldface)

- Adams, J., **Kang, D.W.**, **Krajmalnik-Brown, R.**, Submitted by Crestovo LLC. “Methods for treating autism spectrum disorder and associated symptoms” (US patent applications filed; M17-014L, M16-238L, and M15-178L)
- Krajmalnik-Brown, R.**, **Kang, D.W.**, Park, J.G., LaBaer, J., **Ilhan, Z.E.**. Microbiome markers and therapies for autism spectrum disorders. Publication date 2017/8/1, Patent number 9719144.
- Krajmalnik-Brown R.**, **Rittmann B.E.** and Zhang H. Reducing short-chain fatty acids and Energy Uptake in Obese Humans by Managing Their Intestinal Microbial Communities. US Patent no. 9,549,955 (January 24, 2017). PCT/US11/024985, WO/2011/103123.
- Moore A, **Delgado AG**, **Torres CI**, Brudvig G, Moore G, Wang H, Flory J, Lackner K, Fromme P, Crabtree R, Moore T, Batista V, Vermaas W. Mining Air for Fuels and Fine Chemicals. Invention ID D18-085, Tech ID M18-139L, submitted 12/19/2017.
- Zhou, C.**, **Rittmann, B.E.**, Wang, Z., Ontiveros-Valencia, A., **Krajmalnik-Brown, R.**, **Marcus, A.** Method of Precious-Metal Recovery from Waste Streams. Pending, Tech ID M16-072L.

Mentoring Activities

Degrees Conferred

Ph.D.

1. Levi Straka, Bruce Rittmann advisor, Ph.D. in X, Thesis: *Light-Dependent Growth Kinetics and Mathematical Modeling of Synechocystis sp. PCC 6803*, May 2017
2. Sofia Esquivel Elizondo, Rosa Krajmalnik-Brown advisor, Ph.D. in Environmental Engineering from the School of Sustainable Engineering and the Built Environment, Thesis: *Microbial Communities Involved in Carbon Monoxide and Syngas Conversion to Biofuels and Chemicals*, Fall 2017.

Masters

1. Sam Nandakumar, Chemical Engineering, MS Project Title: *Performance of a flat plate horizontal photobioreactor under different hydraulic and solid retention times and photosynthetically available radiation*, Process Engineer at FlipChip International, May 2017
2. Srivatsan Mohana Rangan, Civil, *Trade-offs in Utilizing of Zero-Valent Iron for Synergistic Biotic and Abiotic Reduction of Trichloroethene and Perchlorate in Soil and Groundwater*, Environmental and Sustainable Engineering, started PhD program at ASU, July 2017
3. Eric Traichal, MS Project Title: *Feasibility of Calcium Carbonate Precipitation as a Means of Fugitive Dust Control*, May 2017

Undergraduate

1. Taylor Rumsey, BSE Chemical Engineering, 5/17, Defect Analysis Process Engineer at Intel-Micron Flash Technologies (IM Flash)
2. Sammy Aguiar, BSE Chemical Engineering, 5/17, currently pursuing a PhD at University of Illinois at Urbana Champaign.
3. Jamie Lopez, BSE Chemical Engineering, 5/17, now pursuing PhD at Princeton
4. Marisol Luna Agüero, BS Civil (Environmental) Engineering, 5/17, currently a Civil Designer at HilgartWilson, LLC
5. Rachel VonGnechten, BS Civil (Environmental) Engineering, 5/17, currently pursuing a MS at University of Illinois at Urbana Champaign.
6. Francisco Brown-Munoz, BSE Chemical Engineering (SEMTE), with Honors, Thesis: *Biochemical Methane Potential (BMP) Tests and Microbial Electrochemical Cells (MECs) Identify Differences in Pretreated Waste Activates Sludge (WAS) Streams*, Spring 2017, current pursuing MSE at ASU.
7. Evelyn Miranda, Biochemistry BS and Biological Science BS, College of Liberal Arts and Science, Arizona State University, 2015.
8. Aatikah Mouti, Rosa Krajmalnik-Brown and Anca Delgado advisors, B.S. in Genetic, Cell and Developmental Biology (SOLS), Thesis: *The effect of ZVI in creating and maintaining a reductive environment conducive to the dechlorination of TCE and its chlorinated byproducts at a contaminated site*, Fall 2017.

Mentoring Relationships

Ph.D. Students

Steffen Beusseker (Hinsby Cadillo Quiroz)
Diana Calvo Martinez (Bruce Rittmann)
Neng long Chan (Bruce Rittmann)
Tengfei Chen (Bruce Rittmann)
Taylor Davis (Bruce Rittmann)
Blake Dirks (Rosa Krajmalnik-Brown)
Sofia Esquivel Elizondo (Rosa Krajmalnik-Brown)
Caitlyn Hall (Bruce Rittmann)
Steven Hart (Cesar Torres)
Ethan Howley (Cesar Torres)
Neha Jagtap (Treavor Boyer)
Justin Kidd (Rosa Krajmalnik-Brown)
Christine Lewis (Cesar Torres)
Yuanzhe Liu (Bruce Rittmann)
Yihao Luo (Bruce Rittmann)

Evelyn Miranda (Anca Delgado)
Isaias Peraza (Bruce Rittmann)
Erik Poppleton (Anca Delgado)
Srivatsan Mohana Rangan (Rosa Krajmalnik-Brown)
Hannah Ray (Treavor Boyer)
Mark Reynolds (Rosa Krajmalnik-Brown)
Daniella Saetta (Treavor Boyer)
Analissa Sarno (Hinsby Cadillo Quiroz)
Avni Solanki (Treavor Boyer)
Thiago Stangherlin Barbosa (Bruce Rittmann)
Levi Straka (Bruce Rittmann)
Burcu Yavuz (Bruce Rittmann)
Michelle Young (Bruce Rittmann)
Julian Yu (Hinsby Cadillo Quiroz)

Masters Students

Wenxia Xu (Chao Zeng, Krajmalnik-Brown Lab)
Sayalee Joshi (Anca Delgado)
Srivatsan Mohana Rangan (Anca Delgado)
Sam Nandakumar (Cesar Torres)
Zeni Ramirez (Hinsby Cadillo Quiroz)
Shefali Rao (Anca Delgado)

Urusha Regmi, Environmental Engineering (Treavor Boyer)
Aide Robles (Anca Delgado)
Eric Traichal (Cesar Torres)
Chenwei Zheng (Bruce Rittmann, Chen Zhou)

Post-Doctoral Researchers

Onur Apul (Rosa Krajmalnik-Brown)
Everett Eustance (Bruce Rittmann)
Zehra (Esra) Ilhan (Rosa Krajmalnik-Brown)
Dongwon Ki (Cesar Torres)

Outi Lähteenoja (Hinsby Cadillo Quiroz)
Georgios Papacharalampos (Cesar Torres)
Chao Zeng (Rosa Krajmalnik-Brown)

Research Scientists

Anca Delgado (Rosa Krajmalnik-Brown)
Daewook Kang (Rosa Krajmalnik-Brown)
Yen-Jung Lai (Bruce Rittmann)

Juan Maldonado Ortiz (Rosa Krajmalnik-Brown)
Chen Zhou (Bruce Rittmann)

Undergraduates

Sammy Aguiar (Cesar), FURI
Omar Arafa (Diana Calvo Martinez), FURI
Sarah Brown (Steven Hart, Michelle Young)
Francisco Brown Munoz (Michelle Young), FURI,
Swette Scholar
Debbie Chang (Blake Dirks, Krajmalnik-Brown Lab)
Sheridan Davis (Avni Solanki, Daniella Saetta)
Alex Drew (Hinsby Cadillo Quiroz)
Angela Egan (Hannah Ray, Daniella Saetta)
Savannah Hull (Thiago Stangherlin Barbosa)

Patricia Ibaló (Ethan Howley)
Brielle Januszewski (Tengfei Chen), FURI
Evan Jones (Sean Lai)
Nikita Kowal (Daniella Saetta)
Jaime Lopez (Hinsby Cadillo Quiroz), FURI, Swette
Scholar
Marisol Luna Aguero (Megan Altizer, Torres and
Krajmalnik-Brown Lab)
Aatikah Mouti (Anca Delgado, Sri Mohana Rangan,
Krajmalnik-Brown Lab)

Undergraduates (cont'd)

Lincoln Mtemeri (Dongwon Ki)
Mio Ozawa (Diana Calvo Martinez)
Jigar Patel (Daewook Kang, Krajalnik-Brown Lab)
Lidea Peon (Ethan Howley)
Maria Predtechenskaya (Esra Ilhan, Krajalnik-Brown Lab)
Neil Rastogi (Yuanzhe Liu), FURI
Erick Ruiz (Megan Altizer)
Taylor Rumsey (Michelle Young)
Andrea Russell (Francisco Brown-Munoz)

Tarun Shesh (Sean, Everett Eustance)
Riley Tesman (Avni Solanki)
Eric Trinh (Michelle Young)
Rachel VonGnechten (Tengfei Chen)
Ben Wik (Andrew Marcus)
Collette Wilson (Steven Hart)
Theodora Yellowman (Anca Delgado)
Kai Yin (Andrew Marcus, Georgios Papacharalampos)
Diana Zermeno (Sam Nandakumar, Cesar Torres)
Chenwei Zheng (Chen Zhou)

High School Students

Samihan Dani (Everett Eustance), Hamilton High School

Teachers

Natalie Aragon, middle school teacher CBBG (Sri Mohana Rangan, Krajalnik-Brown Lab)
Micah Sandy, high school teacher CBBG (Sayalee Joshi, Delgado Lab)

Quinn Thacker, community college teacher
CBBG (Sayalee Joshi, Delgado Lab)

Volunteers

Chris Connot (Daewook Kang, Krajalnik-Brown Lab)
Rick Kupferer (Dongwon Ki, Torres Lab)

Yesenia Moreno Caro (Daewook Kang, Krajalnik-Brown Lab)
Brad Lusk (Chen Zhou, Rittmann Lab)

Staff

Sarah Arrowsmith (Rosa Krajalnik-Brown)
Garrett Montoya (Bruce Rittmann)
Evelyn Miranda (Rosa Krajalnik-Brown)
Morgan Bennett (Rosa Krajalnik-Brown)

Carole Flores (Bruce Rittmann)
Carlos Leyva (Treavor Boyer)
Matt Scholz PhD (Bruce Rittmann)
Rob Stirling (Bruce Rittmann)

Visiting Scholars (mentors in parentheses)

1. Juan Sebastian Arcila Henao, PhD student from the National Autonomous University of Mexico (Sam Nandakumar and Cesar Torres)
2. Rashmi Chandra PhD, Center of Biotechnology at Tec de Monterrey (Yen-Jung Lai)
3. Min Long, PhD student from the College of Environmental Science and Engineering, Tongji University (Chen Zhou)
4. Jianfang Wang PhD, Suzhou University of Science and Technology (Chen Zhou)
5. Guowen Wang PhD, School of Light Industry and Chemical Engineering, Dalian Polytechnic University (Chen Zhou)
6. Hua Xu, PhD student from Shanghai Normal University (Chen Zhou)
7. Kun Zhang PhD, College of Power and Energy Engineering, Harbin Engineering University (Yen-Jung Lai)
8. Xiong Zheng PhD, College of Environmental Science and Engineering, Tongji University (Chen Zhou)
9. Nianbing Zhong PhD, College of Optical and Electronic Technology, Chongqing University of Technology (Chen Zhou)
10. Yun Zhou, PhD student from the Department of Environmental Engineering, Tongji University (Yen-Jung Lai)

Special Activities

1. Francisco Brown-Munoz. Graduate Ambassador - Society of Hispanic Professional Engineers (SHPE), ASU Chapter. Planned and hosted the Graduate School Panel (9/21/2017) to encourage undergraduates to pursue graduate school in STEM, Medicine, and Law. (Dr. Torres also helped me out to this as he was one of our panelists, so he can put this as outreach if he wants to).
2. Sofia Esquivel Elizondo. Isolation and characterization of 2 novel microorganisms: a new Pleomorphomonas species and a new strain of Acetobacterium wieringae that generates ethanol and acetate from CO.
3. Everett Eustance. Poster Session/Young Innovators Lounge Chair at Algae Biomass Summit 2017. Everett Eustance.
4. Damien Finn. Invited speaker: High-throughput sequencing and computational analysis of functional genes with FunGene, Qiime and R. Dr James Cole, Dr Ryan Penton, Dr Hinsby Cadillo-Quiroz, and Dr Damien Finn. Arizona State University School of Life Sciences Summer Workshop 2017, Tempe, AZ, USA.
5. Caitlyn Hall.
 - a. Professional Development:
 - i. Post-Graduate Environmental Biotechnology Intensive Course TU Delft
 - ii. Center for Geotechnical Modelling Centrifuge Users' Workshop UC Davis
 - iii. Video Techniques for Effective Science Communication Workshop ASU
 - iv. CBBG Future Industry Professional Development Workshop Series, Organizer ASU
 - v. CBBG Future Faculty Development Workshop Series, Organizer ASU
 - b. Committees and Groups
 - i. CBBG Student Leadership Council, *President*
 - ii. CBBG Student Leadership Council, *Chair*
 - iii. Geo-Institute Graduate Student Organization, *Treasurer*
 - iv. Environmental Engineering Faculty Search Committee, *Student Contributor*
 - c. Award Reviewer
 - i. ASU GPSA Graduate Student Awards
 - d. Teaching and Curriculum Development
 - i. SSEBE @ ASU, CEE 598 Biogeotechnical Engineering Curriculum Development, Guest Lecturer
 - e. Collaborations
 - i. Groundwater Technologies in Rotterdam, Netherlands. Microbially induced calcium carbonate precipitation for ground stabilization.
 - ii. Deltares, Delft, Netherlands. Microbially induced calcium carbonate precipitation for ground stabilization.
 - iii. Delft University of Technology in Delft, Netherlands. *Visiting Researcher, Department of Geoscience and Engineering, Civil Engineering and Geosciences*. Continuing development of a biogeochemical model to predict microbially induced calcite precipitation and desaturation for use in reactive transport models
 - iv. University of California at Davis, *Visiting Researcher, Civil and Environmental Engineering, College of Engineering*. Investigation of biogenic gas production via denitrification effects on liquefaction triggering at depth using the Center for Geotechnical Modelling centrifuge.
6. Juan Maldonado Ortiz.
 - a. Invited to evaluate a PhD Thesis in Barcelona, Spain
 - b. Continued to manage the Microbiome Analysis Lab, housed within the Swette Center. We received samples from 3 labs within the Swette Center, 12 ASU labs outside of the Swette Center, 9 university labs outside of ASU including NOAA, University of Washington, University of Colorado Denver, NAU, University of New Mexico, Cedar Sinai Medical Center LA, Midwestern Univesrity, and Binghamton

University; three companies; 4 international institutions; We contributed data to 11 funded projects and 8 publications

7. Andrew Marcus
 - a. Gave a workshop on mathematical modeling in Ben-Gurion University of the Negev in May.
 - b. Completed the following courses and earned certificates from Coursera. Courses 1-3 are on Deep Learning, which is a method from artificial intelligence. I am hoping we can apply the method in the future for microbiome-based diagnostics of human health. Course 4 is a creative writing course to improve my writing skill and whetting my appetite for communication.
 - i. Neural Networks and Deep Learning
 - ii. Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization
 - iii. Structuring Machine Learning Projects
 - iv. Creative Writing: The Craft of Plot
8. Isaias Peraza.
 - a. In May, I attended the Intel International Science and Technology fair in Los Angeles, California where I was a judge for the Environmental Engineering section.
 - b. In June, I participated in the International Energy Summit in Merida, Yucatan, Mexico. In where I gave a talk about the use of Sediment Microbial Fuel Cells as a potential solution for the pollution problems in the wetlands of the Yucatan peninsula.
9. Bruce Rittmann and Matt Scholz, Sustainable Phosphorus Alliance.
 - a. Infrastructure support and Advisory Committee to develop Bylaws, Code of Conduct, Strategic Plan, 5-year budget, and formal membership agreement to launch a North American sustainability initiative that will protect our waters from the deleterious effects of nutrient pollution from farms, cities, and other sources.
 - b. Developed strategic relationships with the US EPA's AgStar program and with the Water Environment Foundation.
 - c. Orchestrated *Phosphorus Forum 2017* in Washington, DC, which brought together 80 participants from industry, civil society, and academia to network and share knowledge on issues as diverse as nutrient sustainability on-farm and urban wastewater treatment.
 - d. Established a quarterly Sustainable Phosphorus webinar series on [our YouTube channel](#).
 - e. Connected with industry through participation in a number of events throughout the country, including Biocycle 2017 in Portland, Waste to Worth 2017 in North Carolina, Phosphates 2017 in Tampa, and Biosolids & Residuals 2017 in Seattle.
 - f. Established a rapidly growing social media presence to include an active Twitter feed of 850 subscribers and a quarterly newsletter with ~350 subscribers.
10. Daniella Saetta. Collaborated with Dr. Dragan Boscovic from the ASU School of Computing, Informatics, and Decision Systems Engineering to build and operate remote sensing technology for urinal testbed
11. Analissa Sarno. Microbial Education Teaching and Outreach (MENTOR) lab, MIC 494 Graduate Student Research Assistant: "Heterotrophic bacteria from three contrasting peatlands of the Amazon basin". The core concept of this effort is to develop an Inquiry Based Learning effort where students organize and executed microbial research under the tutelage of more experienced undergraduate mentors taking on roles of mentee and subsequently mentor. Students learn many basic aseptic microbiology techniques including cell culture, media formulation, differential testing, protocol formulation and quantitative techniques all while gaining an excellent understanding of microbiological research. The microbial research is done in collaboration with active research projects at ASU or outside collaborating institutions.
12. Michelle Young. Active reviewer for the following journals: Advanced Materials, ChemSusChem, Current Biochemical Engineering, Journal of Environmental Informatics

13. Chen Zhou. I became the Chief Research Officer (**CRO**) of **Precient Technologies, LLC**, the company Bruce and I co-founded, and am responsible for detailed implementation of Research and Development (R&D) strategic programs.
14. Sarah Arrowsmith organized the Center United Way Campaign and attended the Biosecurity Workshop in December.
15. Carole Flores organized and wrote curriculum for the Biodesign Chief Science Officer event on November 28th.

Outreach and Service

1. Website. <http://www.environmentalbiotechnology.org/> published 21 news articles and 12 blog articles.
2. Twitter. <https://twitter.com/envirobiotech?lang=en> 210 followers
3. Night of the Open Door (Feb 2017): Megan Altizer, Sarah Arrowsmith, Sophia Esquivel Elizondo, Carole Flores, Caitlyn Hall, Dongwon Ki, Rick Kupferer, Sean Lai, Evelyn Miranda, Juan Maldonado Ortiz, Georgios Papacharalampos, Mark Reynolds, Bruce Rittmann, Daniella Saetta, Analissa Sarno, Cesar Torres, Michelle Young, Chen Zhou,
4. ASU Homecoming Volunteers (Nov 2017): Megan Altizer, Patricia Ibaló
5. Chief Science Officers at Biodesign (Nov 2017): Sofia Esquivel Elizondo, Carole Flores, Juan Maldonado Ortiz, (www.chiefscienceofficers.org).
6. Biology Behind Bars. BSCEB Ph.D. students Steven Hart, Blake Dirks, and Ethan Holland teach in a biology program within the Browning Unit of the Eyman Prison, Florence AZ. See Steven's 4/5/16 [blog entry](#).
7. Francisco Brown-Munoz. Noche de Ciencias (STEM Night) at Lowell Elementary School and Metro Tech High School (Phoenix, AZ) as part of the Society of Hispanic Professional Engineers (SHPE) at ASU outreach.
8. Neng long Chan. Song for BIO 151 lab: *You are the future*. <https://www.youtube.com/watch?v=T8gQe03uMVI>
9. Anca Delgado. 11/2/17 Tour of lab and Q&A sessions for South Mountain Community College students part of Western Alliance to Expand Student Opportunities club. These students were interested in biology and are the first in their families to go to college. The purpose of the tour and Q&A session was to have a discussion and encourage them to pursue careers in science.
10. Blake Dirks. I currently participate in the Microbiology Graduate Student Association (MGSA), GPSA, and the Prison Biology program.
11. Sofia Esquivel Elizondo. Laboratory tour guide for visitors from Mexican Institutions and others
12. Ethan Howley. Prison Biology Program
13. Esra Ilhan. Easy Valley Regional Bioscience Collaboration
14. Brielle Januszewski.
 - a. Fulton Ambassador: Reached out to middle school and high school students to encourage their interests in engineering and in ASU.
 - b. E2 Camp Counselor: Volunteered to help incoming freshman transition into ASU engineering programs through a 3-day, 2-night camp that immerses the students in group engineering activities.
15. Daewook Kang. Attend and represent ASU autism study at 13th Zoowalk for autism research. This event is to support research on autism treatment at ASU, Oct 7th 2017 at Phoenix Zoo.
16. Rosa Krajmalnik-Brown.
 - a. [Facebook](#). 36 posts, 333 people reached
 - b. Recommendation panel National Academies of Science and Medicine
 - c. NIH proposal reviewer
 - d. NSF proposal reviewer
 - e. ERC Thrust leader
 - f. mSphere Associate Editor 2015-Current.
 - g. Drs. Krajmalnik-Brown and Kang were featured in the webinar [Autism Live](#).

- h. Dr. Krajmalnik-Brown, et.al. "Insights into butyrate production via gene predictions" was published on mSystems and came out as an "Editor's pick," and also featured on the cover of the journal. Dr. Krajmalnik-Brown and Sofia Esquivel Elizondo were featured in [Multitasking Microbes video](#).
 - i. Drs. Krajmalnik-Brown and Zehra Ilhan published Distinctive microbiomes and metabolites linked with weight loss after gastric bypass, but not gastric banding in the [ISME journal](#).
 - j. Drs. Krajmalnik-Brown and Rittmann, along with 3 other BSCEB researchers, received a patent for Reducing short-chain fatty acids and energy uptake in obese humans by managing their intestinal microbial communities (9,549,955).
17. YenJung (Sean) Lai and Everett Eustance.
 - a. East Valley Regional Bioscience Collaboration
 18. Brad Lusk.
 - a. Arizona Science and Engineering Fair (AzSEF) Judge
 - b. Intel Science and Engineering Fair (ISEF) Grand Judge
 - c. Phoenix Comicon – Interactive science panel presenter
 - d. Ocotillo Elementary – In class science lesson
 - e. <https://www.sciencetheearth.com/>
 19. Analissa Sarno.
 - a. Outreach Co-Coordinator, Microbiology Graduate Student Association, Spring '17 Develop and coordinate outreach activities for MGSA that teach the community about the importance of microbiology in everyday life.
 - b. GPSE, Kyrene de la Esperanza Science Fair Judge, Spring '17
 20. César Torres
 - a. [Twitter](#). 427 followers
 - b. ISMET News Editor, ISMET Board
 - c. ChE Graduate Committee, Interim Program Chair
 - d. Faculty Search Committee
 - e. ChE Grand Challenges Scholar Program Advisor
 - f. AEM Editorial Board
 - g. Chem E Car Team Faculty Advisor
 21. Michelle Young.
 - a. Founding member and graduate committee chair for Activities and Engagement for the Society of Water and Environmental Leaders (SWEL)
 - b. ASU Graduate and Professional Students Association grant reviewer
 - c. Future Cities Regional Competition Society Judge
 - d. Active member of the Young Professionals section of the AZ Water Association
 22. Robert Stirling delivered a day-long Techno-Economic Workshop, Techno-Economics for Biological and Chemical Processes, for BSCEB members on May 23, 2017.

Awards and Accolades (alphabetical by person after no. 1)

1. Fulton Schools of Engineering Dean's Fellows:

a. Megan Altizer	c. Ethan Howley
b. Caitlyn Hall	d. Burcu Yavuz
2. Megan Altizer. Phoenix Scottsdale Groundwater Scholarship 2017, Dean's Fellowship Award.
3. Neng long Chan. Nominee of the ASU Faculty Women's Association Distinguished Graduate Student Award; School of Life Sciences Graduate Ambassador Fellowship; Teaching Excellence Award
4. Taylor Davis. Dean's Fellowship Award.

5. Blake Dirks. School of Life Sciences Graduate Fellowship, Graduate and Professional Student Association (GPSA) Travel Grant
6. Sofia Esquivel Elizondo. Nominated to the Dean's dissertation award of the school of Engineering.
7. Damien Finn. Endeavour Postdoctoral Research Fellowship, Australia Research Council and Ecologically relevant clades of soil microbial species as described by species functionality. Endeavour Postdoctoral Research Fellowship, Australian Research Council.
8. Caitlyn Hall.
 - a. School of Sustainable Engineering and the Built Environment Graduate Symposium, 1st Place, Tempe, AZ
 - b. Geotechnical Frontiers 2017 Graduate Student Poster Competition, Finalist, Orlando, FL
9. Dongwon Ki. Innovation Award for Best Technological Advancement for 2017 from International Society for Microbial Electrochemistry and Technology (ISMET) with the paper published in Chemical Engineering Journal: Ki D, Popat SC, Torres CI (2016) Reduced overpotentials in microbial electrolysis cells through improved design, operation, and electrochemical characterization. Chem Eng J 287: 181- 188.
10. Evelyn Miranda received the "Multidisciplinary STEM Solutions Cohort X Western Alliance to Expand Student Opportunities (WAESO) Louise Stokes Alliance for Minority Participation (LSAMP) Bridge to the Doctorate (BD)" Fellowship. This award pays for my tuition and stipend as a Ph.D. student for 2 years.
11. Srivatsan Mohana Rangan. For the 2nd consecutive year, Sri received the Az Water scholarship for research regarding groundwater remediation.
12. Mark Reynolds.
 - a. Solid Waste Association of America Robert P. Stearns/SCS Engineers Scholarship
 - b. Arizona State University School of Life Sciences Travel Award (Summer 2017)
 - c. Arizona State University Graduate College Travel Award (Summer 2017)
 - d. Arizona State University School of Life Sciences' Molecular/Cellular Biology and Microbiology Retreat Best Poster - Honorable Mention (Fall 2017)
13. Mark Reynolds, "Enhancing methane production from Municipal Solid Waste landfills" - Center for Bio-mediated and Bio-inspired Geotechnics via National Science Foundation. Project funding initiated in Fall 2015 and ceases after Spring 2018
14. Bruce Rittmann.
 - a. Telford Premium 2017 Award, Institution of Civil Engineers (UK) (2017)
 - b. Fellow, Association of Environmental Engineering and Science Professors (AEESP) (2017)
 - c. Fellow, National Academy of Inventors (2017)
 - d. "Gold Medal" Award, Algae Industry Magazine 2017 International Readers' Poll (2017)
 - e. Daniel Jankowski Legacy Award, Ira A. Fulton Schools of Engineering, Arizona State University (2017)
15. Daniella Saetta. First Place Poster at the IEEE 2017 SusTech Conference titled "Urine the cloud: Real-time sensing of nonwater urinal for urine diversion systems and water conservation."
16. Daniella Saetta. Urinal testbed for increased understanding of urine chemistry in building collection systems, funded by SSEBE/ASU
17. Daniella Saetta. CPS: Medium: Water quality Sensing, data-driven Modeling, and Actionable Real-Time (SMART) information for buildings, funded by ASU Future H2O at ASU.
18. Analissa Sarno. Initiative for maximizing student development (IMSD), Institutional Training Grant, NIH (R25), Arizona State University.
19. Analissa Sarno. ASU SOLS, Research Training Initiative for Graduate students. \$1975 awarded for sequencing 13C enriched DNA samples for elucidation of carbon consumption of microbial communities in N. peatlands.
20. Ben Wik. KERN Entrepreneurial Mindset Mini-grant (September 2017), GORE travel grant (October 2017)
21. Michelle Young. Graduate and Professional Student Association (GPSA) Completion Fellowship and GPSA Travel Grant, Fall 2017.