

Curriculum Vitae

EDUCATION

- 01/2011 - 08/2014 **PHD IN ENVIRONMENTAL SCIENCE AND ENGINEERING**
ENGINEERING RESEARCH CENTER (ERC) ON REINVENTING THE NATION'S URBAN WATER INFRASTRUCTURE (ReNUWit)
COLORADO SCHOOL OF MINES (Golden, Colorado)
- Supervisors: Prof. Dr. Jörg E. Drewes (Primary advisor) & Prof. Dr. Junko Munakata-Marr (Co-advisor)
 - Research topics: Environmental microbiology, wastewater engineering, advanced water treatment processes, membrane bioreactors, water reclamation and reuse, data-driven treatment plant optimization using sensory control and data acquisition.
 - Additional activities: wastewater treatment plant operator and engineer, industry liaison (Aqua-Aerobic Systems, INC)
- 08/2009 - 12/2011 **MASTER OF SCIENCE IN ENVIRONMENTAL SCIENCE AND ENGINEERING**
COLORADO SCHOOL OF MINES (Golden, Colorado)
- Supervisor: Prof. Dr. Tzahi Cath
 - Research topics: Sequencing batch membrane bioreactors, biological nutrient removal, operation and energy optimization
- 08/2001 - 05/2005 **BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES, COLLEGE OF AGRICULTURE AND LIFE SCIENCES**
UNIVERSITY OF VERMONT (Burlington, Vermont)
- Biological Sciences, pre-med, evolutionary biology

PROFESSIONAL ACTIVITIES - RESEARCH EXPERIENCE

- 11/2015 – Present **POST-DOCTORAL FELLOW – Laboratory of Molecular Responses**
Desert Research Institute (DRI) Division of Earth and Ecosystem Science (DEES) (Reno, Nevada)
- Research jointly conducted under DRI's Applied Innovation Center (AIC)
 - Regulatory controls of N assimilation, dissimilation, and cost minimization using culture dependent techniques, genomics, and transcriptomics to elucidate the regulatory mechanisms of pathway bifurcation (nitrite ammonification versus denitrification) and nitrous oxide production of nitrate reducing bacterial isolates.
 - Technology development of a Microbial Anaerobic Growth Intervalometer (MAGI) using software driven automation, remote visualization and data acquisition.
- 01/2015 – 11/2015 **POST-DOCTORAL RESEARCH ASSOCIATE – David A. Stahl Lab**
University of Washington (UW) Dept. of Civil and Environmental Engineering (Seattle, Washington)

- 09/2014 – 11/2015
 - Research conducted under the Department of Energy's (DOE) Ecosystem and Networks Integrated with Genes and Molecular Assemblies (ENIGMA) research center.
 - Microbial anaerobic physiology of nitrate-respiring field isolates.**QUANTITATIVE INSIGHTS INTO MICROBIAL ECOLOGY (QIIME) MASTER**
 - Forum Administrator
 - Duties: Fielding and answering questions for QIIME users.
- 09/2014 - 12/2014**RESEARCH ASSOCIATE – Tzahi Y. Cath Lab**

Colorado School of Mines (CSM) Dept. of Civil and Environmental Engineering (Golden, CO)

 - Design and construction of aerobic granular sludge reactors for treatment of produced water and frack flowback from hydraulic fracturing operations.
- 06/2013 - 07/2013**INTERNATIONAL GEOBIOLOGY COURSE**

University of Southern California (USC) Wrigley Institute for Environmental Studies (Los Angeles, California)

 - Molecular biology, bioinformatics, and field research teaching assistant. Early earth geology and evolutionary biology and production of educational videos.
- 06/2011 - 07/2011**MARINE BIOLOGICAL LABORATORY**

Microbial Diversity Course (Woods Hole, Massachusetts)

 - Directors: Dr. Steven Zinder (Cornell) and Dr. Dan Buckley (Cornell)
 - Summer immersion course on microbial culturing (aerobic, anaerobic, microaerophilic), high-throughput sequencing and bioinformatics.
- 08/2009 - 12/2009**CENTER FOR THE EXPERIMENTAL STUDY OF SUBSURFACE ENVIRONMENTAL PROCESSES (CESEP)**

Colorado School of Mines (Golden, Colorado)

 - Lab assistant for transport and remediation of tetrachloroethylene (PCE) in contaminated soils.
- 12/2007 - 08/2009**AVATAR ENERGY, LLC.**

(South Burlington, Vermont)

 - Research Technician: Anaerobic fermentation processes and methanogenesis for onsite treatment and energy generation from dairy cow manure.

TECHNICAL SKILLS

Tools

QIIME, Mothur, Arb, USEARCH, EA-Utils, STAR, Canu, Mauve, FastQC, Trimmomatic, Trinity, Bowtie2, SubRead, DESeq2, Conda (pandas, numpy, seaborn, bokeh), R (ggplot, vegan), vim, Jupyter notebook, AWS

Languages

R, Python, HTML

Statistics

Parametric and nonparametric tests, multivariate statistics, time series analysis

PEER-REVIEWED/EARLY-PRINT JOURNAL ARTICLES - BOOKS PUBLISHED

1. **Vuono D.**, Read R., Hemp J., Sullivan B., Arnone J., Neveux I., Blank B., Staub C., Loney L., Miceli D., Winkler M., Chakraborty R., Stahl D., Grzymiski J. (2018) Resource limitation modulates the fate of dissimilated nitrogen in a dual-pathway Actinobacterium. *In review, The ISME Journal*. Available on BioRxiv: <https://www.biorxiv.org/content/early/2018/09/07/364331>
2. **Vuono D.**, Regnery J., Li D., Jones Z.L., Holloway R., Drewes J.E. (2016) rRNA gene expression of abundant and rare activated sludge microorganisms and growth-rate induced micropollutant removal. *Environmental Science & Technology*, 50(12), 6299-6309.
3. **Vuono D.**, Munakata-Marr J., Spear J., Drewes J.E. (2016). Disturbance opens recruitment sites for bacterial colonization in activated sludge. *Environmental Microbiology*. 18(1), 87-99.
4. **Vuono D.**, C., Benecke J., Henkel J., Navidi W., Holloway R. Cath Y., Munakata-Marr J., Spear J., Drewes J.E. (2015). Disturbance and temporal partitioning of the activated sludge metacommunity. *International Society of Microbial Ecology (ISME) Journal*. 9. 425-435
5. **Vuono D.**, Henkel J., Benecke J., Cath T.Y., Reid T., Johnson L., J.E. Drewes (2013). Flexible hybrid membrane treatment systems for tailored nutrient management: A new paradigm in urban wastewater treatment. *Journal of Membrane Science*. 446. 34-41
6. Bräuer S., **Vuono D.**, Carmichael M.J., Pepe-Ranney C., Strom A., Rabinowitz E., Buckley D., Zinder S. (2014). Microbial sequencing analysis suggest the presence of a fecal veneer on indoor climbing wall holds. *Current Microbiology*. 69. 681-689
7. Prieto A.L., **Vuono D.**, Holloway R., Benecke J., Henkel J., Cath T.Y., Reid T., Johnson L., Drewes J.E. (2013). Decentralized Wastewater Treatment for Distributed Water Reclamation and Reuse: The Good, The Bad and The Ugly – Experience from a Case Study. Book Series “*Novel Solutions to Water Pollution*”, Vol. 1123. Chapter 15, pp 251–266. American Chemical Society.

PARTICIPATION IN (INTER) NATIONAL CONFERENCES

ORAL PRESENTATIONS (by David Vuono)

1. 16th INTERNATIONAL SYMPOSIUM FOR MICROBIAL ECOLOGY (ISME) CONFERENCE **Vuono D.**, Grzymiski J.G., Winkler M.K.H., Chakraborty R., Blank R., Sullivan B., Stahl D.A. (2016). “Nitrate dissimilatory pathway selection depends on carbon concentration in a novel denitrifier/respiratory ammonifier, *Intrasporangium calvum* C5”. 21-26 August 2016, Montreal, Canada.
2. 15th INTERNATIONAL SYMPOSIUM FOR MICROBIAL ECOLOGY (ISME) CONFERENCE **Vuono D.**, Munakata-Marr J., Spear J., Drewes J.E. (2014). “Quantifying the roles of immigration and regrowth during secondary succession”. 24-29 August 2014, Seoul, South Korea.
3. 5th MICROBIAL ECOLOGY AND WATER ENGINEERING (MEWE) CONFERENCE **Vuono D.**, Pepe-Ranney C., Benecke J., Henkel J., Cath T.Y., Munakata-Marr J., Spear J., Drewes J.E. (2013). “Secondary succession and the hidden consequences of disturbance on microbial diversity and ecosystem function”. 7-10 July 2013, Ann Arbor, Michigan.
4. 10th AMERICAN WATER WORKS ASSOCIATION (AWWA) CONFERENCE **Vuono D.**, Pepe-Ranney C., Benecke J., Henkel J., Cath T.Y., Munakata-Marr J., Spear J., Drewes J.E. (2013). “Bacterial diversity and ecosystem recovery in a model microbial ecosystem: Implications for sustainable urban water treatment and reuse. 14 May 2013, Golden, CO.
5. 243rd AMERICAN CHEMICAL SOCIETY (ACS) CONFERENCE **Vuono D.**, Benecke J., Henkel J., Cath T.Y., Johnson L., Reid T., Drewes J.E. (2012). Full scale sequencing batch/membrane bioreactor for distributed wastewater treatment and tailored reuse”. 25-29 March 2012, San Diego, CA.

POSTER PRESENTATIONS (by David Vuono)

1. ROCKY MOUNTAIN GEOBIOLOGY SYMPOSIUM CONFERENCE **Vuono D.**, Read R., Neveux I., Grzymiski J.G. (2017) "Nitrogen cost minimization as a window into earth history and evolutionary adaptation to nutrient limitation". 8 April 2017, Golden Colorado, USA.
2. 16th INTERNATIONAL SYMPOSIUM FOR MICROBIAL ECOLOGY (ISME) CONFERENCE **Vuono D.**, Regnery J., Li D., Jones Z.L., Holloway R., Drewes J.E. (2016). "rRNA gene expression of abundant and rare activated sludge microorganisms and growth-rate induced micropollutant removal". 21-26 August 2016, Montreal, Canada.
3. 15th INTERNATIONAL SYMPOSIUM FOR MICROBIAL ECOLOGY (ISME) 15 **Vuono D.**, Regnery J., Holloway R., Li D., Jones Z., Drewes J.E. (2014). "Temporal dynamics of active microbial populations and function in batch-fed activated sludge treatment systems". Invited Poster presentation at 15, 24-29 August 2014, Seoul, South Korea.
4. 14th INTERNATIONAL SYMPOSIUM FOR MICROBIAL ECOLOGY (ISME) **Vuono D.**, Stanish L., Benecke J., Henkel J., Munakata-Marr J., Spear J., Drewes J.E. (2012). "Immigration effects and recovery through a time-series disturbance gradient in a full-scale sequencing batch/membrane bioreactor". 19-24 August 2012, Copenhagen, Denmark.
5. IWA 8th MICROPOLLUTANTS AND ECO HAZARDS CONFERENCE **Vuono D.**, Regnery J., Holloway R., Li D., Prieto A., Drewes J.E. (2013). Towards the smoking gun: Linking temporal microbial activity with trace organic chemical removal in a demo-scale sequencing batch membrane bioreactor. 16-19 June 2013, Zürich, Switzerland.

ASSOCIATED PROJECTS

1. IWA 8th MICROPOLLUTANTS AND ECO HAZARDS CONFERENCE Drewes J.E., Alidina A., **Vuono D.**, Roa P., Holloway R., Regnery J., Li D. (2013). Recent Advances using Engineered and Natural Treatment Processes to Remove Micropollutants. Oral presentation. 16-19 June 2013, Zürich, Switzerland.
2. AMERICAN GEOPHYSICAL UNION, FALL 2013 Metzger G., Monteverde D., Kelly H., Bournod C., Wang D., Frantz C., Osburn M., Berelson W., Sessions A., Hanselmann K., Johnson H., Stamps B., **Vuono D.**, Shapiro R., and Spear J. (2013) Biogeochemistry of Stinking Springs, UT Part I: Inorganic carbon dynamics and constraints on nutrient fluxes in a warm, salty, sulfidic spring. Poster presentation. December 9-13, San Francisco, CA.
3. AMERICAN GEOPHYSICAL UNION, FALL 2013 Monteverde D., Metzger G., Bournod C., Kelly H., Johnson H., Sessions A., Osburn M., Shapiro R., Rideout J., Johnston D., Stevenson B., Stamps B., **Vuono D.**, Hanselmann K., and Spear J. (2013) Biogeochemistry of Stinking Springs, UT Part II: Microbial Diversity and Photo- and Chemo-Autotrophic growth rates in a layered microbial mat. Poster presentation. December 9-13, San Francisco, CA.
4. 16th INTERNATIONAL EWA SYMPOSIUM Benecke J., Henkel J., **Vuono D.**, Cath T.Y., Drewes J.E., Johnson L., Reid T. (2012). Wastewater Reuse for Urban Irrigation. "Sustainable Wastewater Management – New Solutions". Oral presentation. 8-9 May 2012, Munich, Germany.
5. 27th ANNUAL WATER REUSE SYMPOSIUM Prieto A.L., Benecke J., **Vuono D.**, Holloway R., Henkel J., Cath T.Y., Drewes J.E. (2012) Urban landscape irrigation using an SBMBR system for on-site wastewater reclamation. Oral presentation. September 9-12, 2012, Hollywood, FL.
6. 27th ANNUAL WATER REUSE CONFERENCE Henkel J., **Vuono D.**, Benecke J., Drewes J.E. Cath T.Y., Johnson L., Reid T. (2011). Three years experience with a demonstration-scale SBR-MBR hybrid system for onsite wastewater treatment and reuse. Oral presentation. September 11-14, 2011. Phoenix, AZ.
7. 242nd AMERICAN CHEMICAL SOCIETY (ACS) CONFERENCE Henkel J., **Vuono D.**, Benecke J., Drewes J.E., Cath T.Y., Johnson L., Reid T. (2011). Full Scale Hybrid Sequencing Batch/Membrane Bioreactor for

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Distributed Water Reclamation and Reuse of Domestic Wastewater. Oral presentation. August 28-September 1, 2011, Denver, Colorado.

AWARDS, SCHOLARSHIPS AND FUNDING RECORD

1. NATIONAL SCIENCE FOUNDATION ENGINEERING RESEARCH CENTER SEED AWARD (2013) - \$25,000
2. ACHIEVEMENT REWARDS FOR COLLEGE SCIENTISTS (ARCS) (2010-2013) - \$15,000
3. EDNA BAILEY SUSSMAN FOUNDATION (2010) - \$5000

TEACHING AND ORGANIZATIONAL ACTIVITIES

1. Guest lectures and seminars at the University of Nevada Reno and Agricultural Research Service (USDA), Reno, NV
2. Masters and undergraduate student mentorship (2012-2014)
3. Teaching Assistant of molecular biology, field research, bioinformatics, and ecological analysis for the International Geobiology Course (Summer 2013)
4. Workshops and guest lectures on bioinformatics and next-generation sequencing processing, as well as multivariate statistical analyses and diversity analyses for microbial ecology (2011-Present)
5. Field instructor and outdoor educator for Outward Bound Wilderness, Leadville, Silverton and Marble Colorado (2005-2006)

SERVICE AND OUTREACH

1. Science outreach through the Desert Research Institute's office of communications (2015-present)
2. Host for weekly and scheduled tours of the Mines Park Water Reclamation Test Site. Attendees include: Undergraduate and graduate courses held at the Colorado School of Mines, local schools and science educators (2010-2014)
3. Peer Mentor for undergraduate Senior Design projects on Anaerobic digestion, Colorado School of Mines, Golden Colorado (2009-2010)
4. Volunteer photographer for The Access Fund, an advocacy organization that keeps U.S. climbing areas open and conserves the climbing environment (2009-Present)

EXTRACURRICULAR ACTIVITIES

1. PROFESSIONAL PHOTOGRAPHY AND MOTION PICTURE: www.davevuono.com & vimeo.com/davevuono
 - Roles: Cinematographer/Director, videographer and video editor
 - Content: Science outreach and communication, rock climbing and adventure photography, videography, and aerial imaging using unmanned aerial systems (UAS).

AFFILIATIONS

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International Society of Microbial Ecology (ISME), American Society for Microbiology (ASM), Water Environment Federation (WEF), International Water Association (IWA), American Water Works Association (AWWA)