

Caryl Ann Becerra, Ph.D.

EDUCATION

- 2004–2010** University of Massachusetts, Amherst
Doctor of Philosophy in Microbiology
Dissertation Title: Role of Sulfate-Reducing Bacteria in the Attenuation of Acid Mine Drainage Through Sulfate and Iron Reduction
Dissertation Advisor and Chair: Klaus R. Nüsslein
Dissertation Committee: James Holden, Sue Leschine, and Richard Yuretich
- 2001–2003** California State University of Los Angeles
Master of Science in BioGeology
Thesis Title: Sediment Surface Area, Organic Carbon, and Chemical Fractionation of Sediments of Point Mugu, CA
Thesis Advisor and Chair: Crist S. Khachikian
Thesis Committee: Tina Salmassi and Barry Hibbs
- 1997–2001** Occidental College, Los Angeles, CA
Advanced Bachelor of Arts in Biochemistry and Environmental Science
Undergraduate Research Advisor: James Sadd

HONORS AND AWARDS

- 3/12:** UC President's Postdoctoral Fellowship Finalist
- 9/10 to – 2/11:** Northeast Alliance for the Graduate Education and Professoriate (NEAGEP) Postdoctoral Fellowship
- 9/07 to 9/10:** Ford Foundation Pre-doctoral Fellowship
- 9/07 to 5/08:** ASM Diversification Funding Program for UMass-Amherst ASM Student Chapter program of "Microbiology a Diverse Field."
- 9/04 to 5/07:** CEA-CREST Bridges to the Ph.D. Fellowship
- 10/27/06:** SACNAS Student Chapter of the Year Award received at the National SACNAS conference
- 4/23/04:** Special Recognition in Graduate Studies, Honors Convocation, California State University of Los Angeles, CA
- 10/2003:** Governor's Environmental and Economic Leadership Award of Recognition, Certificate of Recognition, California Governor's Office

C.A. Becerra

6/1/2003: President's Scholars Ambassador, California State University, Los Angeles, Office of Outreach and Recruitment

6/02 to 8/02: International Agouron Geobiology Program

9/01 to 0/03: CEA-CREST Graduate Fellowship

1/00 to 5/00: Academic Student Project Grant for the Synthesis and Model Study of Copper (II) tris (1-pyrazolyl) borate Complexes, Occidental College, Los Angeles, CA. Prof.'s Reef Hardy and Michael Hill (Chemistry Department, Occidental College).

8/97 to 05/01: Trustee Scholar, Occidental College, Los Angeles, CA.

8/97 to 5/01: Navy-Marine Corps Relief VADM E. P. Travers Scholarship.

8/97 to 5/98: American Petroleum Engineering Society, Ventura County, CA.

8/97 to 5/98: Callens-Friedrich Educational Scholarship, Ventura County, CA.

RESEARCH EXPERIENCE

10/10 to 3/11: Joint Postdoctoral Fellow, Organismic and Evolutionary Biology, Harvard University and Geology department, Amherst College. Prof. Peter Girguis, 16 Divinity Ave., 3085 Biolabs, Cambridge, MA 02138. Prof. Anna Martini, 202 Beneski Bldg, PO Box AC# 2238, Amherst, MA 01002.

Summary of role and accomplishment: described bacterial community in the sediments of the lower Connecticut River, enumerated methanogens and sulfate-reducing bacteria to correlate with a chemical depth profile of sediment cores.

Methods: Quantitative-PCR, DNA extraction from soil, cloning, ion chromatography

1/05 to 8/10: Research Assistant, Microbiology department, University of Massachusetts, Amherst.

Summary of role and accomplishment: directly instruct and advise Masters candidates on a daily basis, lead undergraduates in independent research projects; conducted dissertation project on evaluating the role of sulfate-reducing bacteria on the attenuation of AMD. Prof. Klaus Nüsslein, 639 North Pleasant Street, Amherst, MA 01003.

Methods: PCR, cloning, anaerobic culturing techniques, radiolabelled-sulfide distillation, fluorescent *in situ* hybridization, epifluorescence microscopy, quantification of DOC, inductively coupled plasma spectroscopy, DGGE, SYSTAT, phylogenetic analyses programs

6/01 to 9/03: Research Assistant, Civil Engineering department, California State University of Los Angeles.

Summary of role and accomplishment: conducted environmental research on the relationship of organic carbon content and total sediment surface area for improvement of assessing metal contamination. Prof. Crist Khachikian, 5151 State University Drive, Engineering and Technology A212, Los Angeles, CA 90032.

Methods: surface area analyzer, CHNS/O analyzer, inductively coupled plasma spectroscopy

6/99 to 6/01: Research Assistant in Geology, Occidental College.

Summary of role and accomplishment: geochemical study on the bioavailability of metal contaminants in sewage sludge and marsh sediment from Point Mugu Naval Air Station, CA using standard sequential extraction methods, operated ICP-AS, analyzed data, presented at SCCUR, and supervised three part-time lab assistants; Prof. James Sadd, Occidental College, 1600 Campus Drive, LA, CA 90042.

1/98-5/00: Undergraduate research assistant, Department of Chemistry, Occidental College.

Summary of role and accomplishment: synthesis and model study of Copper (II) tris (1-pyrazolyl) borate complexes; Prof. Michael Hill, Occidental College, 1600 Campus Drive, LA, CA 90042.

PUBLICATIONS

Becerra, C.A., E. Lopez-Luna, S.J. Ergas, K. Nüsslein, (2009). Microcosm-based study of the attenuation of an acid mine drainage-impacted site through biological sulfate and iron reduction, *Geomicrobiology*, **26**: 9-20.

Coggon, M., **C.A. Becerra**, K. Miller, R. Yuretich, K. Nüsslein, (2012). Bioavailability of jarosite as an electron acceptor in stimulating AMD attenuation, *Geochemica et Cosmochimica Acta*, **78**: 65-76.

Becerra, C.A., B. Murphy, and K. Nüsslein, (2012). Biogenic sulfide-mediated iron reduction in acid mine drainage, *in prep.*

Sengupta, A., **C.A. Becerra**, K. Nüsslein, D. Ahlfeld, (2012). Comparison of iron reduction rates in an acid mine drainage affected stream and hyporheic zone – a modeling and microcosms approach, *in prep.*

Barreto, C.C., **C.A. Becerra**, K.L. Forloney, K. Nüsslein, (2012). Prevalence of Acidobacteria in the attenuation of acid mine drainage in a long abandoned mining site, *in prep.*

ORAL PRESENTATIONS

Becerra, C.A. and K. Nüsslein, “Role of Sulfate-Reducing Bacteria in the Attenuation of Acid Mine Drainage through Sulfate and Iron Reduction” Biogeochemistry Seminar, UC Santa Barbara, invited, April 2012

Becerra, C.A. and K. Nüsslein, “Attenuation of Acid Mine Drainage by Sulfate-Reducing Bacteria,” Girguis Lab, OEB, Harvard University, invited, November 2009.

Becerra, C.A. and K. Nüsslein, “Attenuation of Acid Mine Drainage by Sulfate-Reducing Bacteria,” Ecology and Evolutionary Biology Dept., invited, University of California, Irvine, March 2009.

Becerra, C.A. and K. Nüsslein, “Attenuation of Acid Mine Drainage by Sulfate-Reducing Bacteria,” Microbiology Department Seminar, University of Massachusetts, Amherst, November 2008.

Becerra, C.A. and K. Nüsslein, “Attenuation of acid mine drainage by microbes,” Microbiology Department Seminar, University of Massachusetts, Amherst, May 2007.

Becerra, C.A., A. Sengupta, D.A. Ahlfeld, K. Nüsslein, "Natural attenuation of acid mine drainage by microbiological and hydrological processes at Davis Mine, Rowe, MA," MA Water Resources Research Center, University of Massachusetts, Amherst, April 2007.

Becerra, C.A. and K. Nüsslein, "A microcosms study on the natural attenuation of acid mine drainage at Davis mine," Microbiology Department Seminar, University of Massachusetts, Amherst, April 2006.

Becerra, C.A., E. Lopez-Luna, S. Ergas, and K. Nüsslein, "Natural attenuation of acid mine drainage simulated in microcosms of Davis mine, Rowe, Massachusetts," SACNAS (Society for Advancement of Chicanos and Native Americans in Science) Annual National Conference, Denver, Colorado, peer-reviewed, September 2005.

Becerra, C.A. and C.S. Khachikian, "Bioavailability of Metals in Pt. Mugu Sediments," CEA-CREST Winter Series Seminar, California State University, Los Angeles, invited, February 2003.

Becerra, C.A., N.W. Wong, and C.S. Khachikian, "A study of sediment surface areas and organic carbon content," Research and Creative Activity Symposium, California State University, Los Angeles, peer-reviewed, March 2002.

Becerra, C.A. and J. Sadd, "A geochemical study of toxic heavy metals suite," Southern California Conference of Undergraduate Research (SCCUR), California State University, Long Beach, peer-reviewed, November 2000.

POSTERS

Becerra, C.A. and K. Nüsslein, "Sulfate-reducing bacteria attenuate acid mine drainage," International Society of Microbial Ecology, Seattle, WA, peer-reviewed, August 2010.

Murphy, B., **Becerra, C.A.**, and K. Nüsslein, "Sulfate-reducing bacteria and biogenic sulfide—understanding a natural attenuation phenomenon within acid mine drainage," 110th Annual General Meeting of the American Society of Microbiology, peer-reviewed, San Diego, CA, May 2010.

Becerra, C.A. and K. Nüsslein, "Bacterial sulfate reduction at an acid mine drainage site," 109th Annual General Meeting of the American Society of Microbiology, Philadelphia, PA, peer-reviewed, May 2009.

Wong, A., **Becerra, C.A.**, and K. Nüsslein, "Isolation of acidophilic/tolerant sulfate-reducing bacteria from an attenuated acid mine drainage site," 109th Annual General Meeting of the American Society of Microbiology, peer-reviewed, Philadelphia, PA, May 2009.

Murphy, B., **Becerra, C.A.** and K. Nüsslein, "Iron reduction mediated by sulfide in an acid mine drainage site," 109th Annual General Meeting of the American Society of Microbiology, Philadelphia, PA, peer-reviewed, May 2009.

Murphy, B., **Becerra, C.A.** and K. Nüsslein, "Iron reduction mediated by sulfide in an acid mine drainage site," HHMI Undergraduate Life Science Research Symposia, University of Massachusetts, peer-reviewed, May 2009.

Bassa, L., **Becerra, C.A.** and K. Nüsslein, "Enrichment of acidotolerant sulfate-reducing bacteria from an acid mine drainage site," 41st Annual Fall Metropolitan Association of College and University Biologists, Montclair, New Jersey, November, 2008. Excellent Poster Presentation.

C.A. Becerra

Becerra, C.A. and K. Nüsslein, "Microbial sulfate reduction in the attenuation of acid mine drainage," 108th Annual General Meeting of the American Society of Microbiology, Boston, MA, peer-reviewed, June 2008.

Wong, A., **Becerra, C.A.** and K. Nüsslein, "Attenuation of acid mine drainage by microbes," HHMI Undergraduate Life Science Research Symposia, University of Massachusetts, May 2008.

Patel, S., **Becerra, C.A.** and K. Nüsslein, "Visualization and quantification of sulfate-reducing bacteria in acid mine drainage impacted site," HHMI Undergraduate Life Science Research Symposia, University of Massachusetts, May 2008.

Murphy, B., **Becerra, C.A.** and K. Nüsslein, "Contribution of iron reduction by biogenic sulfide in the attenuation of acid mine drainage," HHMI Undergraduate Life Science Research Symposia, University of Massachusetts, May 2008.

Becerra, C.A. and K. Nüsslein, "Attenuation of acid mine drainage by microbes," New England Microbial Physiology, Ecology, and Taxonomy, June 2007

Becerra, C.A. and K. Nüsslein, "Visualization of sulfate-reducing bacteria in microcosms of an acid mine drainage site," SACNAS Annual National Conference, Tampa, Florida, peer-reviewed, October 2006.

Becerra, C.A. and K. Nüsslein, "Flask microcosm studies of microbial sulfate reduction contributing to the natural attenuation of acid mine drainage at Davis mine, Rowe, Massachusetts," 106th Annual General Meeting of the American Society of Microbiology, Orlando, Florida, peer-reviewed, May 2006.

Becerra, C.A., E. Lopez-Luna, S. Ergas, K. Nüsslein, "Natural attenuation of acid mine drainage from microcosms of Davis mine in Rowe, Massachusetts," The Annual International Conference on Soils, Sediments, and Water, University of Massachusetts, Amherst, peer-reviewed, October 2005.

Lopez-Luna, E., **C.A. Becerra**, K. Nüsslein, S. Ergas, "In situ and laboratory studies on the role of natural attenuation of acid mine drainage," Massachusetts Water Resources Research Center Annual Conference, University of Massachusetts, Amherst, peer-reviewed, October 2005.

Salmassi, T.M. **C.A. Becerra**, A. Martinez, N. Wong, *et al.* "Soil Bacterial diversity in a high CO₂ Region of Mammoth Mountain, California," 103rd Annual General Meeting of the American Society of Microbiology, Washington, D.C., peer-reviewed, May 2003.

Becerra, C.A., N.W. Wong, C.S. Khachikian, "Organic carbon content versus surface areas in Point Mugu Sediment," CEA-CREST Annual Conference, Los Angeles, California, May 2002.

Becerra, C.A., N.W. Wong and C.S. Khachikian, "Sediment surface area, organic carbon and metals fractionation in the sediment of Point Mugu, CA," Annual American Geophysical Union (AGU) Conference, San Francisco, peer-reviewed, December 2002.

SYNERGISTIC ACTIVITIES

6/08 to 12/10: Undergraduate and Intern Mentor for the Northeast Alliance for the Graduate Education and Professoriate.

7/08 to 9/08: Natural Resources and the Environment (NRE) Graduate Research Committee to discuss the creation of an internal, competitive grants program that would support and stimulate high-caliber research amongst graduate students, and help recruit the most competitive students.

12/07 to 2/08: Search Committee for the Associate Dean of Outreach and Research in the College of NRE at the University of Massachusetts, Amherst.

10/25/07-10/26/07: 14th Institute on Teaching and Mentoring Representing the Alliance for Graduate Education and the Professoriate Program, Orlando, FL.

10/05 to 5/08: Co-Chair of the Graduate Education and Career Development Initiative (GECDI). Summary of role and accomplishments: raised \$36,000 in two years, organized special topics workshops related to graduate education and career development, co-organized the day-long, annual, regional event called "A Ph.D. Is Not Enough," obtained funding and organizers for events at University of Massachusetts. (www.umass.edu/gecdi).

7/06 to 7/08: President of the Microbiology Graduate Student Group at the University of Massachusetts, Amherst. Summary of role and accomplishment: founded the peer mentoring and orientation program for new graduate students of the Microbiology department, obtained ASM funding to invite a seminar speaker to the department, lead monthly meetings, serve as liaison between graduate program director and the graduate students. (www.bio.umass.edu/micro/nusslein/MGSG/).

5/06 to 8/07: Vice President of the Student Chapter for the Society for the Advancement of Chicanos and Native Americans (SACNAS). Summary of role and accomplishment: recruitment of under-represented minority undergraduate and graduate students to SACNAS; launch outreach campaign to local high schools, assisted in establishing student chapter at a school in Puerto Rico, S.U. Diego Bravo. (www.sacnas.org)

5/06 to present: American Society of Microbiology (ASM) Minority Mentor. Summary of role and accomplishment: to mentor any interested undergraduate student.

TEACHING EXPERIENCE

10/10: Guest Lecture in Hydrogeology Course, Amherst College.

04/09: Guest Lectures in Environmental Microbiology Course, University of Massachusetts, Amherst.

03/08: Guest Lecture in Microbiology Honors Colloquium, University of Massachusetts, Amherst.

12/07: Guest Lecture on "Environmental Microbiology" in General Microbiology Course, University of Massachusetts, Amherst.

9/04-12/04: Teaching Assistant in Pathogenic Bacteriology Lab Course, University of Massachusetts, Amherst.

OTHER WORK EXPERIENCE

10/02-6/03: College Recruitment Intern, Office of Outreach and Recruitment, California State University of Los Angeles. Summary of description and accomplishment: assisted students at Eagle Rock High School, Eagle Rock, CA to assess academic interests, preparation of college and financial aid applications, organized the first “Engineering Day” of students to meet current college students and faculty of various engineering disciplines, tour labs and participate in demonstrations.

1/00-5/00: Calculus Gateway Facilitator, Math Department, Occidental College, Los Angeles. Summary of description and accomplishment: tutored calculus, administered and graded qualifying exams.

5/99-8/99: Resident Hall Advisor, Office of Student Housing, Occidental College, Los Angeles. Summary of description and accomplishment: counseled and planned activities for residents.

8/98-5/99: Peer Mentor Program, Office of Cultural Awareness, Occidental College, Los Angeles. Summary of description and accomplishment: held workshops and weekly Wednesday Study Night Sessions at the Cultural Resource Center, distributed college academic resources, publicized events, created newsletters, gathered evaluations and other information (i.e. Retention of past participants, GPA of past and present participants).

FEATURED INTERVIEWS

“UMass researcher shows off work from mine at conference” by Kim Beson, The Massachusetts Daily Collegian, November 3, 2005.

“Bacteria boost clean-up of sulfide mine in Rowe, Mass., says UMass Amherst Scientist” by Rachel Ehrenberg, Office of News and Information, University of Massachusetts, Amherst, October 19, 2005.

“Student expands research with competitive geobiology course” by Julie Schoen, CEA-CREST Quarterly, California State University, Los Angeles, Summer Quarter, 2002

PROFESSIONAL MEMBERSHIPS

American Society of Microbiology (ASM)

American Geophysical Union (AGU)

International Society of Microbial Ecology (ISME)

Society for the Advancement of Chicanos and Native American (SACNAS)

REFERENCES

Klaus Nüsslein, Ph.D. advisor and Graduate Program Director of Microbiology, University of Massachusetts, Amherst
nusslein@microbio.umass.edu; 413-545-1356.

Sue Leschine, Ph.D. committee member, University of Massachusetts, Amherst
suel@microbio.umass.edu; 413-545-0673.

Sandra Petersen, Associate Dean of the Graduate School and Professor of Biology and Director of the Northeast Alliance for the Graduate Education and Professoriate (NE-AGEP), University of Massachusetts, Amherst
spetersen@vasci.umass.edu 415-545-1808.

Anna Martini, Postdoctoral advisor, Chair of Environmental Studies and Professor of EEMB, University of California, Santa Barbara
josh.schimmel@lifesci.ucsb.edu; 805- 893-7688.