

## ***Curriculum vitae – August, 2009***

### ***Carrine Eleece Blank***

*Research Assistant Professor*

Geosciences Department

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University of Montana

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406-241-2038

### ***Education***

Ph.D, 2002	Department of Integrative Biology	University of California, Berkeley, CA.
BSc 1992	Microbiology and Immunology	University of Washington, Seattle, WA.
BSc 1992	Cell and Molecular Biology	University of Washington, Seattle, WA.

### ***Dissertation***

*Microbial Life at High Temperatures and Relationships Through Deep Time.*

### ***Professional Experience***

2007-present	Research Assistant Professor, Geosciences Dept., University of Montana, Missoula.
2002-2007	Assistant Professor, Dept. of Earth & Planetary Sciences, Washington University, St. Louis.
1994-2002	Ph.D. candidate. Advisor: Brent D. Mishler, Dept. of Integrative Biology, U.C. Berkeley.
1999-2002	M.Sc. student (1997-2000), Dept. of Geology and Geophysics, C.U. Boulder, and Dept. of Earth & Planetary Sciences, U.C. Berkeley. Advisor: Bruce M. Jakosky.
1995	NASA Planetary Biology Internship (PBI), NASA-Ames Research Center.
1992-1994	Research Technician. Advisor: John Leigh, Dept. of Microbiology and Immunology, University of Washington.
1991	Summer Undergraduate Research Fellowship. Advisor: John Waterbury, Woods Hole Oceanographic Institute.
1990-1992	Undergraduate Research Fellow. Advisor: Rose Ann Cattolico, Dept. of Botany, University of Washington.

### ***Academic Interests***

Developing phylogenomic dating methods for constraining the age of microbial clades and their associated morphological and ecological traits. Studying the co-evolution of early microbial life and early Earth; reconstructing the earliest microbial biogeochemical cycles.

Microbial phylogenetics and evolution; identifying core phylogenies and lateral gene transfer of metabolic genes.

#### *Additional projects:*

Microbial diversity and biosignature preservation in near boiling silica-depositing geothermal springs in Yellowstone National Park.

Testing relative stress responses in thermophilic and hyperthermophilic microbes by performing hypervelocity impact experiments.

### ***Honors***

Nominated by the U.S. National Academy of Sciences as one of the top "100 of the country's leading young scientists in diverse branches of science" to participate in the Frontiers of Computing session of the 12<sup>th</sup> Kavli German-American Frontiers of Science Symposium, Potsdam, Germany. "Attendees are selected from a pool of young researchers (under 45) who have made significant contributions to science".

### ***Field Experience***

Yellowstone National Park, silica-depositing hot spring microbial ecology and evolutionary studies, summers of 1995-99, 2003-08; Yellowstone, fumarole microbial ecology, summers 1997-99; Glacier National Park, Belt Supergroup, stromatolite sample collection, 2005; Marquette Range Supergroup, Kona Dolomite, stromatolite sample collection, summer 2005; Snowy Pass Supergroup, Nash Fork Formation, stromatolite collection, summer 2007.

## RESEARCH

### *Manuscripts in Review*

- Blank, CE. Not so old Archaea – The antiquity of biogeochemical processes in the archaeal domain of life. *Geobiology*, in review.
- Blank CE and Sánchez-Baracaldo P. Timing of morphological and ecological innovations in the Cyanobacteria – A key to understanding the rise in atmospheric oxygen. *Geobiology*, in review.

### *Publications*

- Blank CE. 2009. Phylogenomic dating - A method of constraining the age of microbial taxa that lack a conventional fossil record. *Astrobiology*, 9(2):173-192.
- Blank CE. 2009. Phylogenomic dating – The relative antiquity of archaeal metabolic and physiological traits. *Astrobiology*, 9(2):192-220.
- Blank CE. 2008. Phylogenomic dating and the relative ancestry of prokaryotic metabolisms. In: "*From Fossils to Astrobiology*", edited by M. Walsh and J. Seckbach, Springer-Verlag.
- Sánchez-Baracaldo P, Hayes PK, and Blank CE. 2005. Evolution of morphological and habitat characters in the Cyanobacteria using a compartmentalization approach. *Geobiology*, 3(3):145-165.
- Blank CE. 2004. Evolutionary timing of the origins of mesophilic sulfate reduction and oxygenic photosynthesis: A phylogenomic dating approach. *Geobiology*, 2:1-20.
- Blank CE, Cady SL, and Pace NR. 2002. Microbial composition of silica-depositing thermal springs throughout Yellowstone National Park. *Applied and Environmental Microbiology*, 68(10):5123-5135.
- Leigh JA, Kessler PS, and Blank CE. 1998. Regulation of *nif* gene expression in *Methanococcus maripaludis*, In: "*Biological Nitrogen Fixation for the 21st Century*", C. Elmerich, A. Kondorosi, and W. E. Newton, eds., pp. 115-116.
- Kessler PS, Blank CE, and Leigh JA. 1998. The *nif* gene operon of the methanogenic archaeon *Methanococcus maripaludis*. *Journal of Bacteriology*, 180(6):1504-1511.
- Cohen-Kupiec R, Blank CE, and Leigh JA. 1997. Transcriptional regulation in Archaea: *In vivo* demonstration of a repressor binding site in a methanogen. *Proceedings of the National Academy of Sciences USA*, 94:1316-1320.
- Cattolico RA, Hariharan T, Johnson P, Blank C, and Kurtz H. 1996. Evolutionary variations in phosphoribulokinase among autotrophic organisms. *Journal of Phycology*, 32(3):SUPPL. 10.
- Blank CE, Kessler PS, and Leigh JA. 1995. Genetics in methanogens: transposon insertion mutagenesis of a *Methanococcus maripaludis nifH* gene. *Journal of Bacteriology*, 177:5773-7.

### *Committee Reports*

- Huntress WT, Noonan NE, Atreya SK, Blank CE, *et al.*, 2007. *Grading NASA's Solar System Exploration Program; A Midterm Review*. National Research Council Committee on Assessing NASA's Solar System Exploration Program.

### *Student Papers*

- Zimmerman KM. 2007. Microbial ecology in Yellowstone National Park: Developing curriculum and conducting field activities. Annual NASA-Missouri Space Grant Consortium Meeting, Saint Louis, MO.
- Ranatunga NS. 2007. 'GoldFISH' in the identification of microbes from the natural environment. Annual NASA-Missouri Space Grant Consortium Meeting, Saint Louis, MO.
- Champaloux SW. 2005. Phylogenomic studies of bacteria. Annual NASA-Missouri Space Grant Consortium Meeting, Springfield, MO.
- Champaloux SW. 2004. Phylogenomic dating studies of the bacteria; Co-evolution between early microbial life and the early Earth's chemistry, Regional NASA Space Grant Conference, Chicago, IL.

### ***Funded Projects/Awards***

- 2009 Principal Investigator, Montana Space Grant, EPSCoR Research Infrastructure Development Awards, \$41,388, "*Developing Innovative Phylogenetic Methods to Establish the Antiquity of Microbial Processes - The Archaeal Domain of Life as a Test Case*"
- 2004-2009 Co-Principal Investigator, NASA Office of Space Science, Exobiology Program, \$775,877, "*Recognizing the Signatures of Thermophilic Biofilms: Cellularly Preserved Microfossils and Cellular Remnants*"
- 2004-2008 Principal Investigator, NASA Office of Space Science, Exobiology Program, \$106,595, "*Do Bugs Survive When Worlds Collide? Or, An Experimental Study of the Response of Microbes to Ballistic Impact*"
- 2003-2007 Co-Principal Investigator, NASA-Missouri Space Grant Consortium, \$25,486 (annual budget for EPSc affiliate).
- 2006 Co-Principal Investigator, NASA-Missouri Space Grant Consortium, Augmentation Proposal, ~\$145,850.
- 2004 Co-Principal Investigator, NASA Space Grant Consortium, Aerospace Workforce Development Competition, \$86,125.
- 2003- Co-Principal Investigator, NASA-Missouri Space Grant Consortium, \$36,925 (annual EPSc affiliate budget).
- 2002 Principal Investigator, McDonnell Center for Space Sciences, Washington University, \$30,000 matching funds to purchase DNA sequencer.
- 2002 NSF Bioinformatics Post-Doctoral Fellowship, \$100,000 (\$50k/yr), declined to take faculty position at Washington University.
- 2001-2002 Mini-grant award, \$15,000, Center for Integrative Planetary Sciences, University of California, Berkeley.
- 1997-2000 NASA Graduate Student Researchers Program (GSRP) grant, \$66,000.
- 1997 Outstanding Student Presentation, American Geophysical Union fall meeting.
- 1996-1997 NIH Training Grant in Cell and Molecular Biology, University of California, Berkeley.
- 1997 Travel award, Workshop on Molecular Evolution, Marine Biological Laboratory.
- 1995-1996 Training Grant in Cell Molecular Biology, Indiana University.
- 1995 NASA Planetary Biology Internship, NASA-Ames Research Center.
- 1994-1995 GAAN Fellowship, Indiana University.
- 1992 Summer Undergraduate Research Fellowship, Woods Hole Oceanographic Institute.
- 1990 Howard Hughes Medical Institute (HHMI) Undergraduate Research Fellowship, University of Washington.

### ***Pending Proposals***

Principal Investigator, NSF Geobiology and Low Temperature Geochemistry Program, \$102,057, "*Establishing the antiquity of traits and biogeochemical processes in the thermophilic bacteria across geologic time*".

### ***Invited Talks & Seminars***

- Not so old Archaea - Adventures in the phylogenic dating of microbial lineages without a conventional fossil record*, 9-14-09, Department of Biological Sciences, University of Montana, MT.
- Phylogenomic Dating: A new method to determine the age of important microbial groups and biogeochemical cycles*, 8-25-08, Department of Geosciences, University of Montana, MT.
- Using molecular geobiological approaches to elucidate the 'Precambrian Problem' and reconstruct early biogeochemical cycles*, 1-30-07, Department of Earth Sciences, University of Oxford, UK.
- Phylogenetic reconstruction of Paleoproterozoic microbial ecosystems*, 3-30-06, Department of Geology, University of Kansas, Lawrence, KS.
- Bacterial survival and evolution - Reconstructing the early history of life*, 9-19-05, Department of Geological & Planetary Sciences, California Institute of Technology, Pasadena, CA.
- Phylogenomic dating studies to reconstruct early microbial ecosystems*, 9-1-05, Department of Earth & Planetary Sciences, Washington University, St. Louis, MO.
- Evolution of ecological and morphological traits in the Cyanobacteria*, 8-25-05, Wenner-Gren International Symposium on Marine Cyanobacteria; Evolution, Function, and Genomes, Stockholm, Sweden.
- When did the major archaeal groups (and their traits) originate?* 5-31-05, International Conference on Astrobiology, McMaster University, Ontario, Canada.

*Geomicrobiology at the Hilltop Campus*, 5-16-05, Division of Biology and Biomedical Sciences joint MD/PhD program, Washington University, St. Louis, MO.

*Phylogenomic dating and the timing of major divergences on the tree of life*, 1-16-05, Origin of Life Gordon Research Conference, Ventura, CA.

*Antiquity of physiological processes*, 12-12-04, NSF workshop on Molecular Methods in Paleobiology. San Francisco, CA.

*Evolutionary patterns of niche specialization in the tree of life; implications for early life on Earth and the search for life elsewhere*, 11-7-04, GSA Annual Meeting, Topical Session T45, Seattle, WA.

*Phylogenomic dating of major divergences and metabolisms on the tree of life - Implications for life on Mars*, 10-14-04, Second Conference on Early Mars, Geologic, Hydrologic, and Climatic Evolution and the Implications for Life, Jackson Hole, WY.

*Using phylogenomic dating techniques to reconstruct the microbial composition of the early Earth*, 7-27-04, Lunar and Planetary Institute, Houston, TX.

*Using phylogenomic dating to establish age constraints for the origin of microbial lineages and to reconstruct the archean biosphere and early biogeochemical cycles*, 4-30-04, Department of Geophysical Sciences, University of Chicago, IL.

*Phylogenomic dating: A new method to establish age constraints for the origin of multiple microbial metabolisms and to reconstruct the archean biosphere*, 2-19-04, Department of Earth and Environmental Sciences, Univ. of Illinois at Chicago, IL.

*Co-evolution of the early earth biosphere and geosphere*, 9-19-03, Department of Geology, University of Illinois at Urbana-Champaign, Urbana, IL.

*Using phylogenomics to build a better bacterial tree and the geologic record to date the origin of Cyanobacteria; Implications for the archean biosphere*, 4-7-03, New York Center for Studies on the Origins of Life, Rensselaer Polytechnic Institute, NY.

*Reconstructing ancient divergences in the tree of life*, 2-1-03, Tree of Life Symposium, University of California, Berkeley, CA.

*Yellowstone's boiling silica depositing springs as model microbial ecosystems for environmental genomics*, 2-25-02, DOE/Joint Genome Institute, Walnut Creek, CA.

*Ancient divergences in the bacterial tree: A total evidence approach*, 1-18-02, NASA-Ames Research Center, Moffett Field, CA.

#### ***Contributed Presentations at National Meetings (since 2002)***

Blank CE. 2009. Freshwater to marine diversifications of the Cyanobacteria and eukaryotic algae – implications for the step-wise oxygenation of the biosphere from the Paleoproterozoic to the Neoproterozoic. Geological Society of America, annual meeting.

Cady SL, Hugo RC, Stone J, Smythe WF, Hinman NW, and Blank CE. 2009. Recognizing signs of life in opaline silica hydrothermal deposits: A comparison of biosignature suites in two geochemically distinct hot spring deposits in Yellowstone National Park, USA. Geological Society of America, annual meeting.

Sánchez-Baracaldo P and Blank CE. 2008. Character and relaxed molecular clock study of ancient cyanobacterial traits. 56<sup>th</sup> Annual British Phycological Society Meeting, Bristol, UK.

Blank CE. 2007. Timing of cyanobacterial adaptations from freshwater to marine ecosystems – A possible key to understanding the rise in atmospheric oxygen. Geological Society of America, annual meeting.

Blank CE. 2007. Timing of cyanobacterial ecological innovations – A key to understanding the rise in atmospheric oxygen. Alexander von Humboldt/U.S. National Academy of Sciences German-American Frontiers of Science Symposium, Irvine, CA.

Blank CE, Ahrens TJ, Long M, Bertani LE, Rashev M, Cady SL, Hugo RC, and Orphan VH. 2007. Ballistic impact studies of a thermophilic bacterium – The importance of growth phase in survival. Lunar and Planetary Science Conference, Houston, TX.

Tenesch AC, Hinman NW, and Blank CE. 2006. A new look at factors affecting microbial silicification: Effects of microbe to solution ratio, Al and Fe on silica accumulation on *B. subtilis* surfaces. American Geophysical Union, fall meeting.

Blank CE. 2006. Phylogenomic dating – A new approach for reconstructing ancient environments and biogeochemical cycles on the early earth. 12<sup>th</sup> Annual German-American Frontiers of Science Symposium, Potsdam, Germany.

Hinman NW and Blank CE. 2005. Home away from home: Earth analogs for interplanetary environments suitable for hosting life. INSA Space Policy Institute meeting, Big Sky, MO.

- Blank CE. 2005. Do bugs survive when worlds collide? NASA Exobiology principal investigator's meeting, NASA-Ames Research Center, Moffett Field, CA.
- Blank CE. 2004. Phylogenomic methods to guide paleontological searches for the early Cyanobacteria, American Geophysical Union, fall meeting.
- Blank CE and Sánchez-Baracaldo P. 2004. Phylogenomic dating and early evolutionary patterns in the Cyanobacteria, Geological Society of America, annual meeting.
- Blank CE. 2003. Phylogenetic Reconstructions of the composition of Archean and Paleoproterozoic microbial communities, 2003 Geological Society of America, annual meeting.
- Blank CE. 2003. Phylogenomic dating of major clades in the archaeal tree of life. Origins of Life Gordon Research Conference.
- Sánchez-Baracaldo P, Blank CE, Handley BA, and Hayes P. 2003. Phylogenetic analyses of natural populations of pico- and other Cyanobacteria. European Phycological Society Meeting, Belfast, Ireland.
- Blank CE and Amend JP. 2003. Using the great oxidation event and whole genome sequences to establish upper age constraints for multiple archaeal groups. NASA Astrobiology Institute Annual Meeting.
- Blank CE. 2002. Why microbial ecology and ecogenomics needs geochemistry: An illustrated example. American Geophysical Union, fall meeting.
- Blank CE. 2002. Could Cyanobacteria have provided the source of oxidants for banded iron formation? Geological Society of America, annual meeting.
- Blank CE. 2002. Using the geologic and genomic molecular phylogenetic records to better understand the co-evolution of microbial metabolisms and the early earth environment. NASA Astrobiology Science Conference (AbSciCon), NASA-Ames Research Center.
- Blank CE and Mishler BD. 2002. Ancient divergences in the bacterial tree of life: A total evidence genomic approach. Gordon Conference on the Origin of Life, Ventura, CA.

## TEACHING

### *Teaching (at University of Montana)*

#### *Guest Lectures:*

10-12-07	Geos 595
10-20-07	Biol 295
3-12-09	Biol 495/595

### *Teaching (at Washington University)*

#### *Courses Taught:*

Fall 2006	EPSc 480	Controversies in Astrobiology
Spring 2006	EPSc 230	Intro to Astrobiology
Spring 2006	EPSc 500	Topics in the Geosciences – History of Science
Fall 2005	EPSc 449	Microbes in the Environment
Spring 2005	EPSc 480	Topics in the Geosciences – Microbial Evolution
Spring 2005	EPSc 470	Controversies in Astrobiology
Spring 2005	Bio 580	Seminar in Population Biology -Tree of Life
Spring 2004	EPSc 230	Intro to Astrobiology
Fall 2003	EPSc 330	Geomicrobiology
Spring 2003	EPSc 480	Special Topics - Astrobiology Seminar

#### *Guest Lectures:*

2-14-03	EPSc 323
3-13-03	Bio 349
3-17-03	EPSc 171A
4-14-04	Bio 349
11-17-04	Bio 3501
12-7-05	Bio3501

### ***Mentoring (at University of Montana)***

#### ***undergraduate students:***

Robert Mahon, undergraduate field assistant, summer 2007.

### ***Mentoring (at Washington University)***

#### ***graduate students:***

Alene Onion, master's student in the School of Education, *graduated summer 2006 (now full-time water protection/environmental specialist for Missouri Dept of Natural Resources).*

Kerri Burson, graduate student in DBBS/Molecular Microbiology, 6-2005 to 8-2006 (*now full-time research scientist at Monsanto*).

Amanda Jones, master's student in Biology, 11-2004 to 7-2005, *graduated Spring 2005 (now full-time senior research technician at Binary Ionization Technology Group, San Diego, CA).*

Devi Swain, rotating graduate student in DBBS/Molecular Genetics, 3-2006 to 5-2006.

Tanya Yatsunencko, rotating graduate student in Earth & Planetary Sciences, 8-2004 to 8-2005.

Nancy Hsia, rotating graduate student in Earth & Planetary Sciences, 5-2004 to 7-2004.

Kerry Zimmerman, master's student in the School of Education, *graduated summer 2006 (now biology teacher at Metro Academic and Classical High School, Saint Louis).*

#### ***undergraduate students:***

Zi Teng Wang, undergraduate Biology major, 1-2006 to 6-2007.

Nimna Ranatunga, visiting undergraduate Biology major from Concordia College, 6-2006-1-2007 (*now graduate student at UCLA*).

Beth Zhou, undergraduate Biology major, summer 2006.

David Horton, undergraduate Chemistry major, summer 2005.

Lindsey Ulkus, undergraduate Biomedical Engineering major, 1-2005 to 5-2005, *graduated Spring 2005 (now full-time research technician, Massachusetts General Hospital Cancer Center).*

Adam Timm, undergraduate Biology major, 1-2005 to 5-2005.

Steve Champaloux, undergraduate Biology major, 5-2004 to 5-2005, *graduated Spring 2005 (now in MSc program in Public Health at Brown University).*

Casey Herrforth, undergraduate Biology major, Pathfinder student, 9-2002 to 5-2005, *graduated Spring 2005 (now attending Medical School at University of Wisconsin, Madison).*

Carolyn Cain, undergraduate Biology major, 9-2003 to 9-2004, *graduating Spring 2006 (now attending PhD program in Human Genetics, University of Chicago, IL).*

#### ***technical staff:***

Kurt Hoffmeister, research technician, 1-2006 to 6-2007 (*will be attending medical school at Tulane in the fall*).

## **SERVICE**

### ***Professional and Leadership Activities (since 2002)***

2002-present Editorial Board, *Astrobiology*.

2009 Co-convenor for Topical Session "*Microbial Mats, Biogeochemical Markers, and Microbial Evolution: The Co-Evolution of Early Earth and Microbial Life*", Geological Society of America annual meeting.

2003-2009 Joint Technical Programming Committee representative, Geobiology Geomicrobiology Division, Geological Society of America [*approve topical sessions and division sponsorships, approve abstracts, organize discipline sessions, and assign session convenors for the annual GSA conference.*]

2003-2007 Member of the Executive Board of NASA's Missouri Space Grant Consortium and Director of the Earth and Planetary Sciences affiliate of the Missouri Space Grant Consortium.

2007 Organizing Committee for 2008 14<sup>th</sup> German-American Kavli Frontiers of Science Symposium [*sponsored by US National Academy of Sciences and Alexander von Humboldt Foundation.*]

2007 Co-convenor for Topical Session "*Emerging New Methods in Early Earth Studies: Unraveling the Co-evolution of Earth and Life*", Geological Society of America annual meeting.

2007 Panelist, National Research Council Committee on Assessing the Solar System Exploration Program [*to assess NASA's response to the Council's Decadal Surveys*].

- 2007 Co-convener, session on *Mars Geology*, 13<sup>th</sup> Annual Symposium on German-American Frontiers of Science, co-sponsored by the U.S. National Academy of Sciences and Alexander von Humboldt-Stiftung.
- 2007 Reviewer, textbook *Planetary Habitability*.
- 2006 Organizing Committee for 2007 13<sup>th</sup> German-American Kavli Frontiers of Science Symposium [sponsored by US National Academy of Sciences and Alexander von Humboldt Foundation.]
- 2006 Session co-chair "*Microbial Life in the Subsurface*" NASA Astrobiology Institute 2006 meeting.
- 2006 Scientific Organizing Committee, NASA Astrobiology Institute Astrobiology Science Conference [approved topical sessions, team leader approving abstracts and organizing Geobiology sessions.]
- 2006 NASA Astrobiology Institute Panel Review.
- 2005 External Reviewer, US National Academy of Sciences Space Studies Board document "*Planetary Protection Requirements for Venus Missions*".
- 2005 NSF/Earth Sciences Directorate Review Panel.
- 2005 Teacher Training Workshop, *Archaeal Diversity & Ecology of the Archaea*, UC Berkeley
- 2004 Invited session speaker, NSF workshop of Molecular Paleobiology.
- 2004 NASA/Exobiology Panel Review.
- 2004 Panelist, 2<sup>nd</sup> Early Mars Conference.
- 2004 Panelist, NEON Biodiversity workshop.
- 2003 Appointed member of Division of Biology and Biomedical Sciences, Washington University.
- 2003 Appointed fellow of the MacDonnell Center for Space Sciences, Washington University.
- 2003 Appointed member of Environmental Studies program, Washington University.
- 2002 Membership Committee, Biogeosciences Section, American Geophysical Union.
- 2002 NASA/Exobiology Panel Review.
- 2002 Invited Discussion Leader, NSF Microbial Observatories/LEn PI meeting.

***University Service (at University of Montana)***

Workshop on *curriculum vitae*, UM Geology Club, 10-2-07.

*Ph.D. Qualifying examination committees:*

Doc Richardson	Geosciences	2008
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***University Service (at Washington University)***

Geobiology Curriculum Development Committee.

Led development of EPSc 2<sup>nd</sup> major in Geobiology.

Led development of graduate curriculum in Geobiology.

"Conversations" Committee, fall 2004.

Israelow Scholarship Selection Committee, 2004-2007.

*Ph.D. thesis committees:*

David Weisrock	Evol., Ecol. & Population Biol./DBBS	2003
Rich Glor	Evol., Ecol. & Population Biol./DBBS	2004
D'Arcy Meyer-Dombard	Earth & Planetary Sciences	2004
Kenneth Kozak	Evol., Ecol. & Population Biol./DBBS	2005

*Ph.D. Qualifying examination committees:*

Kelly Flentie	Molecular Microbiology/DBBS	2006
Anon.	Molecular Microbiology/DBBS	2006
Kristen Skillman	Molecular Microbiology/DBBS	2006

***Public Talks and Outreach***

Filmed for A&E Modern Marvels show "*Acids*" in Yellowstone National Park, aired 10-1-07.

Provided advice for National Geographic Article on Glacier National Park and evolution of cyanobacteria and stromatolites, 5-2007.

*Early Earth and Early Life – Recent Paradigm Shifts and New Approaches*, public talk, 3-9-07, given to the Eastern Missouri Society for Paleontology (The Fossil Group), Saint Louis, MO.

*Astrobiology: Life in Extreme Environments – and Life in the Solar System*, public talk, 9-15-06, given to the Saint Louis Astronomical Society.

Instructor for a ten day, hands-on teacher training workshop on Astrobiology in Yellowstone National Park, summer 2006. Workshop was organized by WolfTree, a non-profit educational organization.

Interview for 90-second radio feature MicrobeWorld, 4-26-05, produced by the American Society for Microbiology for National Public Radio.

*Some Like it Hot: Archaeal Diversity and Ecology in the Archaea (the Third Domain of Life)*, Day-long Teacher Training Workshop, 2-5-05, University of California, Berkeley.

Interview by Holger Kroker, Die Welt, 11-9-04, 2004 GSA conference.

*Hot Life: From the Earliest Organisms on Earth to Modern Submarine Oases*, public talk, 9-14-03, 150<sup>th</sup> anniversary celebration, Washington University.

Consultant for exhibit on the evolution of Cyanobacteria, the Exploratorium (Science Museum), 2003, San Francisco.

Interview by Glenn Busby, Producer/Host "The Best of Our Knowledge", National Public Radio, 4-7-03.

Interview with NASA Astrobiology Institute Education and Public Outreach Video Studio, conducted by Daniella Scalice, 2-03.

DeutschlandRadio Interview, 11-02.

*What's Next: Contemplating Life After College*, Pew Undergraduate Research Symposium, 11-02.

*Molecular Evidence for the Early Evolution of Life*, 7-8-02, Teacher Training workshop, Edward Teller Research Center, Lawrence Livermore National Lab, Livermore, CA.

*Microbes in Yellowstone's Boiling Hot Springs: A Slice of Early Life on Earth*, public talk, 5-24-02, Chabot Space and Science Center, Oakland, CA.

### ***Research Featured In***

- "Jumping genes and peculiar ancestors; Evolutionary trees of life on Earth may apply toward Mars", press release by Alison Drain for Washington University, 5-9-05.
- "Kinks in the family tree; Species emerged in fresh water first", press release by Tony Fitzpatrick for Washington University, 2-2-2005.
- "Life-swapping scenarios for Earth and Mars", article by Leonard David for Space.com, 12-2004.
- To the Best of Our Knowledge, NPR show "Women in STEM: Their role models and mentors" Glenn Busby (producer/host), 12-2004.
- "Biologist's find alters the bacterial family tree; Bacteria changes age like a fading starlet" press release by Falland Toscano, Washington University, 4-7-2004.
- Discover magazine, "Earth's Oxygen Enigma" written by Kathy A. Svitil, 2-2003.
- New Scientist, "Ancient Bacterium Sheds a Billion Years", v. 176 issue 2368, 11-2002.
- National Geographic "The Rise of Life on Earth", by Richard Monastersky, 3-1998.
- California Wild Magazine "In Pursuit of a Microscopic Methuselah", by Blake Edgar, Spring 1998.
- EOS Transactions, American Geophysical Union, "A 'Hot' Microbial Find", by Randy Showstack, 11-18, 1997.