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Curriculum vitae

CURRENT POSITION AND ADDRESS:

Mary N. Parenteau (Niki), PhD
NASA Postdoctoral Program Fellow
NASA Ames Research Center
Exobiology Branch
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PROFESSIONAL PREPARATION:

- NASA Postdoctoral Fellow, NASA Ames Research Center, Mountain View, CA. Advisor: Linda Jahnke, 2007-2009.
- Visiting Scientist, Department of Biology, Western Oregon University, Monmouth, OR. NSF Yellowstone National Park Research Coordination Network (RCN) Geothermal Biology and Geochemistry Graduate Student Exchange Award. Advisor: Sarah Boomer, summer 2007.
- Research Assistant, Geomicrobiology and Electron Microscopy Laboratory, Department of Geology, Portland State University. Advisor: Sherry Cady, 2001-2007.
- Forestry Technician, Fire Sciences Laboratory, Canopy Fuels Project, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT. Supervisor: Dr. Elizabeth Reinhardt, 2000-2001.
- Microbiology Technician, Department of Biology, University of Puget Sound, Tacoma, WA. Advisor: Beverly Pierson, 1996-1999.

ACADEMIC DEGREES:

Portland State University, Portland, OR, 2001-2007

- Ph.D., Geology, Summa cum Laude
- Advisor: Dr. Sherry Cady
- Dissertation title: Microbial biosignatures in high-iron thermal springs

University of Puget Sound, Tacoma, WA, 1992-1996

- B.S., Biology, cum Laude
- Advisor: Dr. Beverly Pierson
- Senior thesis title: The description of high-iron environments in Yellowstone National Park and the search for a putative photoferrotroph

AWARDS AND HONORS:

Graduate

- NASA Oregon Space Grant Graduate Fellowship ($18K), 2001-04
- NASA Planetary Biology Internship ($2500, $1000 travel), 2003
  - Advisor: Dr. Linda Jahnke, NASA Ames Research Center
- Association of Engineering Geologists, PSU Chapter
  - Best overall graduate poster, 2003
  - Best science content poster, 2004
  - Best overall graduate poster ($300), 2005
- Student travel grants
  - GSA ($400), 2004
  - NAI ($505), 2006
  - PSU ($150), 2006
- AGU 2006 Fall Meeting Outstanding Student Paper Award, 2006
  - Biogeosciences Section
- NSF Yellowstone National Park Research Coordination Network (RCN), 2007
  - Geothermal Biology and Geochemistry Graduate Student Exchange Program Award ($1800)
- ISEB 18 Taupo, NZ, Wolf Vishniac Memorial Award, 2007

  - Best paper submitted at the symposium by a young investigator ($500)
- NSF Yellowstone National Park Research Coordination Network (RCN), 2008
  - Workshop, Graduate student oral presentation, first place ($250)

SYNERGISTIC ACTIVITIES:

- Co-Advisor, Undergraduate Honors Senior Thesis student Mary Dietrich, Geology Dept., PSU.
- Mentor, Wolftree, a non-profit group dedicated increasing science literacy in 7th and 10th graders in underserved communities (primarily low income, inner city, and rural populations) in the Portland Public School System through field-based and experiential science education in the outdoors.
- K-6 Science Fair, Farmington View Elementary School, Hillsboro, OR, geomicrobiology demonstration.
- Presentation to 2004 Oregon legislative candidates about student research activities at Portland State.
- NASA Astrobiology Institute NASA Ames Team Education and Public Outreach activity: demonstration of hardware and sampling techniques to Lassen Volcanic National Park "Astrobiology Student Interns" to enable them to generate an inventory of all of the geothermal features in the Park. The five-year goal is to establish an online database that parallels that of Yellowstone National Park. This program is conducted in partnership with Lassen Ranger and Education Specialist Steve Zachary.
- NASA Astrobiology Institute NASA Ames Team Education and Public Outreach activity: assisted in the development of six wayside signs with astrobiology content for Lassen Volcanic National Park. These signs will be placed at Sulfur Works and Bumpass Hell.

PROFESSIONAL SOCIETIES:

- American Society for Microbiology, 1996-present
- Geological Society of America, 2001-present
- American Geophysical Union, 2002-present
- Mineralogical Society of America, 2004-present
- Association of Engineering Geologists, 2004-present
- Society for Sedimentary Geology, 2005-present

RESEARCH INTERESTS:

Integrating molecular, microbial ecological and geomicrobiological approaches in analyzing the structure and function of microbial communities and the formation and preservation of their biosignatures in the rock record. Specifically, I am interested in the physiological impact of phototrophic communities on iron oxidation and iron mineral diagenesis, and processes of iron biomineralization. Broadly, I am interested in the origin and early evolution of life and the search for evidence of life on other planetary bodies.

FIELD EXPERIENCE:

Microbial Mats:

- Hot springs: Yellowstone National Park, WY, USA; Mt. St. Helens Volcanic Monument, WA, USA; Rotorua and Taupo, New Zealand
- Marine marginal: Great Sippewissett Salt Marsh, Woods Hole, MA, USA
- Hypersaline: Guerrero Negro, Baja California, Mexico

Geologic Mapping:

- Harney Basin, southeastern Oregon

SUPPLEMENTARY SKILLS:

Analytical and field: Light, epifluorescence, confocal laser, transmission electron (TEM), and scanning electron (SEM) microscopies; energy-dispersive spectroscopy (EDS); electron diffraction (ED); powder x-ray diffraction (XRD); electron microprobe analyses (EMPA); atomic absorption spectroscopy (AA); ion chromatography (IC); inductively coupled plasma mass spectroscopy (ICP-MS); oxygen, pH, redox, and sulfide microelectrodes; carbon-14 and carbon-13 photosynthetic uptake studies; methanol and in vivo pigment analyses; experience culturing thermophilic, hypersaline, and marine cyanobacteria and *Chloroflexus*-like organisms; lipid biomarker analyses using gas chromatography (GC) and gas chromatography-mass spectroscopy (GC-MS); compound-specific stable carbon isotope analyses (CSIA) using gas chromatography-isotope ratio mass spectroscopy (GC-IRMS); mapping using total station and

differential GPS. I am also just beginning to learn how to work with the microbial metagenomic data generated from the DOE JGI Yellowstone National Park Community Sequencing Project.

Computer: Familiarity with MS Windows and Macintosh operating systems. Proficient in use of MS Office, Matlab, ArcView GIS, Surfer, and numerous graphing, image editing, presentation, and web creation programs.

SUPPLEMENTARY TRAINING:

- DOE JGI Microbial Genomics and Metagenomics Workshop 2008
- NASA Astrobiology Institute Biosignatures in Ancient Rocks 2007
- MSA Short Course Neutron Scattering in Earth Sciences 2006
- MSA Short Course Molecular Geomicrobiology 2005

PUBLICATIONS:

Journal articles:

Parenteau M.N., Jahnke L.L., Embaye T., and Cady S.L. (2009) Lipid biomarkers in iron-mineralized phototrophic mats at Chocolate Pots hot springs, Yellowstone National Park, USA. *Geobiology*, in review, #GBI-006-2009.

Parenteau M.N. and Cady S.L. (2009) Microbial biosignatures in iron-mineralized phototrophic mats at Chocolate Pots hot springs, Yellowstone National Park, USA. *Palaios*, accepted pending revision, #P08-133.

Vogel M.B, Des Marais D.J., Turk K.A., **Parenteau M.N.**, Jahnke L.L., and Kubo M.D. (2009) The role of biofilms in the sedimentology of actively forming gypsum deposits at Guerrero Negro, Mexico. *Astrobiology*, accepted pending revision, #AST-2008-0325.

Pierson B.K., Koch G., Johnston A., Shanks L., Werner J., **Parenteau M.** (2009) Physiological activity of *Synechococcus*-*Chloroflexi* mats from a high-iron thermal spring. *FEMS Microbiology Ecology*, in preparation.

Parenteau M.N., Jahnke L.L., Kubo, M., and Cady S.L. (2009) Carbon isotopic signatures of iron-mineralized cyanobacteria and *Chloroflexi* mats in Yellowstone National Park. *Appl. Environ. Microbiol.*, in preparation.

Vogel M.B., Des Marais D.J., Turk K.A., **Parenteau M.N.**, Kubo M.D., and Jahnke L.L. (2009) Microbially-induced sedimentary structures in actively forming gypsum deposits at Guerrero Negro, Baja California Sur, Mexico. *Journal of Sedimentary Research*, in preparation.

Parenteau M.N., Boomer S.M., Noll K.L., Dutton B.E., Cady S.L., Jahnke L.L., Pierson B.K. (2009) Phylogenetic diversity of *Chloroflexus*-like organisms in an iron-depositing hot spring in Yellowstone National Park. *FEMS Microbiology Ecology*, in preparation.

Boomer S.M., K.L. Noll, B.E. Dutton, and **M.N. Parenteau** (2009) Geochemistry and ecology of red mat systems (GERMS) – A long-term monitoring project at red layer microbial observatory sites in Yellowstone National Park. *Environmental Microbiology*, in preparation.

Parenteau M.N. and Cady S.L. (2009) Characterization of natural 2-line and 6-line ferrihydrite from a high iron thermal spring. *American Mineralogist*, in preparation.

Turk K.A., Green S.J., Jahnke L.L., Kubo M.D., **Parenteau M.N.**, Vogel M.B., and Des Marais D.J. (2009) Phylogenetic diversity of bacterial communities from gypsum-precipitating environments. *FEMS Microbiology Ecology*, in preparation.

Pierson B.K. and **Parenteau M.N.** (2000) Phototrophs in high iron microbial mats: microstructure of mats in iron-depositing hot springs. *FEMS Microbiology Ecology* 32, 181-196.

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Pierson B.K., **Parenteau M.N.**, Griffin B.M. (1999) Phototrophs in high-iron-concentration microbial mats: physiological ecology in an iron-depositing hot spring. *Appl. Environ. Microbiol.* 65, 5474-5483.

Conference proceedings:

Parenteau, M.N., Jahnke L.L., Boomer S.M., Cady S.L., Pierson B.K. (2009) Do cyanobacteria use Fe^{2+} as an electron donor for photosynthesis? Abstracts of the General Meeting of the American Society for Microbiology 2009. (poster)

Vogel M., Des Marais D., Jahnke L., Parenteau M. (2008) Distinctive accessory minerals, textures, and crystal habits in biofilm-associated gypsum deposits. Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract P51A-1406. (poster)

Turk K., Green S., Jahnke L., Kubo M., Parenteau M.N., Vogel M., Des Marais D. (2008) Phylogenetic analysis of microbial communities from gypsum-precipitating environments. Astrobiology Science Conference 2008. (poster)

Parenteau M.N., Boomer S.M., Noll K.L., Dutton B.E., Cady S.L., Jahnke L.L., Pierson B.K. (2008) Diversity of Chloroflexus-like organisms in an iron-depositing hot spring in Yellowstone National Park. Abstracts of the General Meeting of the American Society for Microbiology 2008. (poster)

Parenteau M.N., Boomer S.M., Noll K.L., Cady S.L., Jahnke L.L., Pierson B.K. (2008) Diversity of *Chloroflexus*-like organisms in an iron-depositing hot spring in Yellowstone National Park. NSF Yellowstone National Park Research Coordination Network Workshop, January 10-13, Mammoth, WY.

Parenteau M.N., Cady S.L., Jahnke L.L., Pierson B.K. (2007) The role of phototrophs in the biogeochemical cycling of iron. ISEB 18, November 11-16, Taupo, NZ. (poster)

Parenteau M.N., Cady S.L., Jahnke L.L., Pierson B.K. (2007) Linking metabolism to biosignatures: The role of phototrophs in Fe^{2+} oxidation and the formation and preservation of their biosignatures in a modern iron-depositing thermal spring. NASA Astrobiology Institute Biosignatures in Ancient Rocks Field Workshop, September 18-27, Ontario, Canada. (poster)

Parenteau M.N., Cady S.L., Jahnke L.L., Pierson B.K. (2006) Role of iron in the preservation of phototrophic cells: An example from a modern thermophilic community at Chocolate Pots hot springs in Yellowstone National Park, USA. *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract B14B-06. (oral presentation)

Parenteau M.N. and Cady S.L. (2005) Biomineralization of iron oxides by cyanobacteria and the formation of an iron deposit. *Proceedings of the Oregon Academy of Science*, XLI p. 48. (oral presentation)

Parenteau M.N., Jahnke L.L., Embaye T., Cady S.L. (2005) Biosignature formation by cyanobacteria and *Chloroflexus* in the shallow deposits of a high iron thermal spring. *NASA Astrobiology Institute General Meeting*. (poster)

Pierson B.K., Beard B., Cady S.L., Johnston A., Koch G., Luther G., Parenteau M.N., Trouwborst R., Werner J. (2005) Iron oxidation and deposition in cyanobacterial mats in a high iron thermal spring. 8th Annual NASA Exobiology Primary Investigator's Symposium. (oral presentation by B.K. Pierson)

Parenteau M.N. and Cady S.L. (2004) Natural 2-line and 6-line ferrihydrite characterization and microbial biomineralization in a high iron thermal spring. Geological Society of America, 2004 Annual Meeting. *Abstracts with Programs*, 36(5), 475. (oral presentation)

Parenteau M.N. and Cady S.L. (2004) Microbial biosignatures in high iron thermal springs. *Proceedings of the Oregon Academy of Science*, XL p. 33. (oral presentation)

Parenteau M.N., Embaye T., Jahnke L.L, Cady S.L. (2003) Lipid biomarkers and microbial biosignatures in high iron thermal springs. *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract B12B-0778. (poster)

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Parenteau M.N. and Cady S.L. (2003) Microbial biosignatures and primary mineral phases in high iron thermal springs. Geological Society of America, 2003 Annual Meeting. *Abstracts with Programs*, 35(6),150. (poster)

Parenteau M.N., Cady S.L., Pierson, B.K. (2003) Primary mineral phases and biosignatures associated with the phototrophic mats of Chocolate Pots hot springs, Yellowstone National Park, USA. *NASA Astrobiology Institute General Meeting*, 222. (poster)

Pierson B.K., Parenteau M.N. (1999) Structural analysis of phototrophic bacteria and minerals in high-iron microbial mats. *Abstracts of the General Meeting of the American Society for Microbiology* 1999, 450. (poster)

Pierson B.K., Parenteau M.N. (1997) Phototrophic Prokaryotes in high iron environments. IXth International Symposium on Phototrophic Prokaryotes, Vienna. (oral presentation by B.K. Pierson)

Parenteau N., Griffin B M., Pierson B K. (1996) Phototrophs in high iron environments. *Abstracts of the General Meeting of the American Society for Microbiology* 1996, 328. (poster)

Parenteau N. (1996) The description of high-iron environments in Yellowstone National Park and the search for a putative photoferrotroph. University of Puget Sound Undergraduate Senior Thesis Research Symposium, Tacoma, WA. (oral presentation)

Griffin B.M., Parenteau M.N., Pierson B.K. (1995) Phototrophs in high iron sediments in thermal springs. Biodiversity, Ecology, and Evolution of Thermophiles in Yellowstone National Park: Overview and issues, Yellowstone, WY. (poster)

Griffin B.M., Parenteau M.N. (1995) Phototrophs in high iron sediments in thermal springs. Murdock Charitable Trust Regional Undergraduate Conference, Whitman University, Walla Walla, WA. (poster)

Parenteau N. (1995) The description of high-iron environments in Yellowstone National Park and the search for a putative photoferrotroph. Murdock Charitable Trust Summer Undergraduate Research Presentation, University of Puget Sound, Tacoma, WA. (oral presentation)