

KATHLEEN M. SCOTT, Ph.D.

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Current Position

Assistant Professor, University of South Florida.

Degrees

- Ph.D. Biology. Pennsylvania State University at University Park, 1998.
- B.S. Microbiology /Molecular Biology. University of Michigan at Ann Arbor, 1991.

Thesis

- Ph.D. Inorganic carbon use by hydrothermal vent sulfur chemoautotrophic bacteria.

Research Interests

- Physiological ecology of chemolithoautotrophs
- Marine and freshwater biogeochemistry

Honors

- Braddock Fellowship, Department of Biology, Pennsylvania State University. 1992 - 1995.
- NSF Predoctoral Fellowship, 1992 - 1995.

Research Experience

- **Research Assistant, Harvard University, July 2000 - July 2003.**

Co-Principle Investigator: Dr. Colleen Cavanaugh.

Determined the degree to which the kinetic isotope effects of RubisCO from the chemoautotrophic symbionts of the bivalves *Solemya velum* and *Bathymodiolus thermophilus* affect the stable carbon isotope compositions of these organisms.

Modeled carbon flux through the giant tubeworm *Riftia pachyptila* to estimate the size of the CO₂ gradient at the symbiont-host interface.

- **Postdoctoral Fellow, Harvard University, July 1998 – July 2000.**

Co-Principle Investigator: Dr. Colleen Cavanaugh.

Conducted a study of the environmental, physiological, and molecular factors affecting the stable carbon isotope composition of vesicomyid clams with chemoautotrophic symbionts.

- **Graduate Research Assistant, Pennsylvania State University, September 1992 - July 1998.**

Thesis Advisor: Dr. Charles Fisher.

Deduced the forms of dissolved inorganic carbon used by free-living and symbiotic hydrothermal vent chemoautotrophic bacteria.

Characterized the chemical microhabitat of hydrocarbon seep vestimentiferan tube worms, mussels, and vesicomyid clams.

- **Undergraduate Research Fellow, Woods Hole Oceanographic Institute, Summer 1990.**

Project Advisor: Dr. Paul Dunlap.

Described the use of cyclic AMP as the sole carbon and energy source for the bioluminescent light organ symbiont, *Vibrio fischeri*, as well as *Vibrio cholerae*.

Constructed a genomic library of *Vibrio fischeri*.

- **Undergraduate Researcher, University of Michigan, Fall 1988 - Spring 1992.**

Project Advisor: Dr. Harry Douthit.

Developed a mineral salts medium for *Bacillus licheniformis*.

Measured the effect of calcium channel antagonists on *Bacillus cereus* spores.

Teaching Positions

- Mentor for four undergraduate researchers, Harvard University, Fall 1998 – Summer 2003.
- Graduate Teaching Assistant (TA) and Guest Lecturer, *Physiological Ecology*, Pennsylvania State University (PSU), Spring 1998.
- TA, *Cells and Molecules*, PSU, Spring 1997.
- TA, *Function and Development of Organisms*, PSU, Fall 1996.
- Mentor for two undergraduate researchers, PSU, Spring 1996 - Spring 1998.

Publications

- **Scott, K.M.** and Cavanaugh, C.M. (in prep.) Respiratory physiology of the symbiotic clam, *Solemya velum*. *J. Exp. Biol.*
- **Scott, K.M.** and Cavanaugh, C.M. (in prep.) Substrates supporting chemoautotrophy by the endosymbiotic bacteria of the bivalve *Solemya velum*. *Appl. Environ. Microbiol.*
- **Scott, K.M.**, Schwedock, J., Schrag, D. P., and Cavanaugh, C.M. (subm.) Kinetic isotope effect of RubisCO from the chemoautotrophic symbionts of *Solemya velum*. *Environ. Microbiol.*

- Schwedock, J., Harmer, T.L., **Scott, K.M.**, Hektor, H.J. Seitz, A.P., Fontana, M.C., Distel, D.L., and Cavanaugh, C.M. (subm.) Characterization and expression of genes from the RubisCO gene cluster of the chemoautotrophic symbiont of *Solemya velum*: *cbbLSQO*
- **Scott, K.M.**, Lu, X., Cavanaugh, C.M., and Liu, J. (2003) Effect of linearization method on kinetic isotope effects estimated using the Rayleigh distillation equation. *Geochim. Cosmochim. Acta*. In press.
- **Scott, K.M.** (2003) A $\delta^{13}\text{C}$ -based carbon flux model for the hydrothermal vent chemoautotrophic symbiosis *Riftia pachyptila* predicts sizeable CO_2 gradients at the host-symbiont interface. *Environ. Microbiol.* **5**: 424-432.
- Robinson, J.J., **Scott, K.M.**, Swanson, S.T., O'Leary, M.H., Horken, K., Tabita, F.R., and Cavanaugh, C.M. (2003) Kinetic isotope effect and characterization of form II RubisCO from the chemoautotrophic endosymbionts of the hydrothermal vent tubeworm *Riftia pachyptila*. *Limnol. Oceanogr.* **48**: 48-54.
- Smith, E., **Scott, K.M.**, Nix, E., Korte, C., and Fisher, C. (2000) Growth and condition of seep mussels (*Bathymodiolus childressi*) at a Gulf of Mexico brine pool. *Ecology* **81**: 2392-2403.
- **Scott, K.M.**, Bright, M., Macko, S.A., and Fisher, C.R. (1999) Carbon dioxide use with different affinities by chemoautotrophic endosymbionts of the hydrothermal vent vestimentiferans *Riftia pachyptila* and *Ridgeia piscesae*. *Mar. Biol.* **135**: 25-34.
- **Scott, K.M.**, and Fisher, C.R. (1998) The burden of independence: Inorganic carbon utilization strategies of the sulfur chemoautotrophic hydrothermal vent isolate *Thiomicrospira crunogena* and the symbionts of hydrothermal vent and cold seep vestimentiferans. *Cahiers Biol. Mar.* **39**: 379-381.
- Nix, E., Fisher, C., Vodenichar, J., and **Scott, K.** (1995) Physiological ecology of a mussel with methanotrophic endosymbionts at three hydrocarbon seep sites in the Gulf of Mexico. *Mar. Biol.* **122**: 605-617.
- **Scott, K.**, and Fisher, C. (1995) Physiological ecology of sulfide metabolism in hydrothermal vent and cold seep vesicomyid clams and vestimentiferan tube worms. *Amer. Zool.* **35**: 102-111.
- MacDonald, I., Guinasso, N., Sassen, R., Brooks, J., Lee, L., and **Scott, K.M.** (1994) Gas hydrate that breaches the sea floor on the continental slope of the Gulf of Mexico. *Geology* **22**: 699-702.

K. M. Scott

- **Scott, K.M.**, Fisher, C.R., Vodenichar, J.S., Nix, E., and Minnich, E. (1994) Inorganic carbon and temperature requirements for autotrophic carbon fixation by the chemoautotrophic symbionts of the giant hydrothermal vent tube worm, *Riftia pachyptila*. *Physiological Zoology* **67**: 617-638.

Grant Proposals Funded

- Microbial Genome Program, Department of Energy. 2003-2004. Draft-level genome sequence of *Thiomicrospira crunogena* and *Thiomicrospira denitrificans*. Co-written with Stefan Sievert. "Nomination of *Thiomicrospira crunogena* and *Thiomicrospira denitrificans* for genome sequencing by the Department of Energy".
- Biological Oceanography, National Science Foundation. 2003-2006. \$319,553. "Molecular and biochemical basis for stable carbon isotopes in marine autotrophs using Form IC and Form ID RubisCO".
- Biological Oceanography, National Science Foundation. 2000-2003. \$397,879. Co-written with C. Cavanaugh. "Molecular and biochemical basis for stable carbon isotopes in marine autotrophs using Form IA RubisCO".
- West Coast and Polar Regions Undersea Research Center, National Undersea Research Program. 1998-2000, \$117,481 and 6 ALVIN dives. Co-written with C. Cavanaugh. "Environmental, physiological, and molecular factors influencing stable carbon isotope ratios of deep-sea chemoautotrophic symbioses".

Invited Presentations

- "Different choices for different lifestyles: Inorganic carbon uptake by chemoautotrophic bacteria from hydrothermal vents and elsewhere". Fall, 2003. University of Southern Mississippi.
- "Form IA RubisCO from chemoautotrophic bacteria: Kinetic isotope effects". Summer, 2002. Gordon Research Conference: The Molecular Basis of C1 Metabolism.
- "Carbon fixation by chemoautotrophic bacteria from deep-sea hydrothermal vents and elsewhere". Spring, 2003. The University of South Florida.
- "Form IA RubisCO from chemoautotrophic bacteria: Kinetic isotope effects". Summer, 2002. Gordon Research Conference: The Molecular Basis of C1 Metabolism.
- "Carbon dioxide uptake and fixation by chemoautotrophic bacteria from hydrothermal vents and elsewhere". Spring, 2002. Woods Hole Oceanographic Institution.
- "Strangers in the night, exchanging gases: What $\delta^{13}\text{C}$ values tell us about gas exchange in chemoautotrophic symbioses". Winter, 2002. Clark University.

K. M. Scott

- "Carbon dioxide uptake and fixation by chemoautotrophic bacteria from the hydrothermal vents and elsewhere". Fall, 2001. Second International Symposium on Hydrothermal Vent Biology.
- "Inorganic carbon uptake by chemoautotrophic bacteria". Winter, 2000. Woods Hole Oceanographic Institution.
- "Extracellular CO₂ and HCO₃⁻ use by symbiotic and free-living hydrothermal vent sulfur chemoautotrophs". Fall, 2000. Third International Congress on Symbiosis.
- "Stable carbon isotope values of organisms at deep-sea vents". Winter, 2000. San Francisco State University.
- "Carbon fixation by symbiotic and free-living hydrothermal vent chemoautotrophs". Fall, 1999. Harvard University.
- "Inorganic carbon use at in situ pressure by the endosymbionts of the deep sea hydrothermal vent tubeworm, *Riftia pachyptila*." Spring, 1996. Eberly College of Science Graduate Honors Seminar.

Conference Presentations

- **K. M. Scott**, J. Schwedock, and C. M. Cavanaugh. (2002). Form IA RubisCO from chemoautotrophic bacteria: Kinetic isotope effects. Annual Meeting, American Society for Limnology and Oceanography.
- **K. M. Scott**, J. J. Robinson, and C. M. Cavanaugh. (2000). Kinetic parameters of RubisCOs from chemoautotrophic symbioses. Annual Meeting, American Society for Limnology and Oceanography.
- **K. M. Scott**, J. J. Robinson, and C. M. Cavanaugh. (1999). Influence of Form I and Form II Rubisco and environmental dissolved inorganic carbon on stable carbon isotope values in chemoautotrophic bacteria. Juan de Fuca Results Symposium.
- **K. M. Scott**, J. J. Robinson, D. T. Nguyen, J. Schwedock, and C. M. Cavanaugh. (1999). Form I and Form II Rubisco in chemoautotrophic bacteria: Influence on stable carbon isotope values?? General Meeting, American Society for Microbiology.
- **K. M. Scott** and C. R. Fisher. (1998). Inorganic carbon use by symbiotic and free-living hydrothermal vent sulfur chemoautotrophs. Gordon Research Conference on the Molecular Basis of Microbial One-Carbon Metabolism.
- **K. M. Scott**, M. Bright, and C. R. Fisher. (1997). The burden of independence: Inorganic carbon utilization strategies of the sulfur chemoautotrophic hydrothermal vent isolate *Thiomicrospira crunogena* and the symbionts of hydrothermal vent and cold seep vestimentiferans. 1st International Conference on Hydrothermal Vent Biology.

K. M. Scott

- **K. M. Scott** and C. R. Fisher. (1997). Affinities for inorganic carbon and forms used by the autotrophic symbionts of hydrothermal vent vestimentiferans. 2nd International Congress on Symbiosis.
- **K. M. Scott** and C. R. Fisher. (1996). Inorganic carbon utilization at 204 atmospheres by the endosymbionts of the deep sea hydrothermal vent tubeworm, *Riftia pachyptila*. Symbiosis 96!
- C. R. Fisher, I. A. Urcuyo, D. Julian, and **K. M. Scott**. (1996). Hydrothermal vent and cold seep vestimentiferan tubeworms: Very similar symbiotic associations, very different physiological ecologies. Symbiosis 96!
- **K. M. Scott** and C. R. Fisher. (1996). Affinity for inorganic carbon, and the forms of inorganic carbon used, by the autotrophic symbionts of hydrothermal vent vestimentiferans. Annual Meeting, Society for Integrative and Comparative Biology.
- **K. M. Scott**, J. Vodenichar, and C. R. Fisher. (1993). Inorganic carbon substrate of the chemoautotrophic symbionts of *Riftia pachyptila*. Annual Meeting, American Society for Zoology.
- E. Nix, **K. M. Scott**, and C. R. Fisher. (1993). In situ growth of SM1a: An undescribed mytilid fueled by gas. Annual Meeting, American Society for Zoology.

Research Cruise Participation

- 1999: August 23 - September 6, Endeavor Segment, Juan de Fuca Ridge
April 15 - May 5, Clipperton Transform Fault, East Pacific Rise
- 1998: July 29 - August 9, Endeavor Segment, Juan de Fuca Ridge
- 1997: July 9 - 18, Louisiana Slope, Gulf of Mexico
September 6 - 27, Endeavor Segment, Juan de Fuca Ridge
- 1996: February 9 - March 27, Clipperton Transform Fault, East Pacific Rise
October 12 - 20, Endeavor Segment, Juan de Fuca Ridge
- 1995: March 21 - April 12, Clipperton Transform Fault, East Pacific Rise
July 8 - 20, Endeavor Segment, Juan de Fuca Ridge
September 18 - 30, Louisiana Slope, Gulf of Mexico
December 7 - 21, Clipperton Transform Fault, East Pacific Rise
- 1994: July 1 - 15, Endeavor Segment, Juan de Fuca Ridge
September 25 - October 5, Louisiana Slope, Gulf of Mexico (**Chief Scientist**)
November 6 - December 5, Clipperton Transform Fault, East Pacific Rise
- 1993: June 23 - July 14, Louisiana Slope, Gulf of Mexico
- 1992: March 23 - April 24, Clipperton Transform Fault, East Pacific Rise
May 22 - 27, Alaminos Canyon, Gulf of Mexico
August 9 - 22, Louisiana Slope, Gulf of Mexico

Professional Society Participation

K. M. Scott

- American Society for Limnology and Oceanography
- American Society for Microbiology
- Union of Concerned Scientists

Outreach Participation

- **The Educational Cooperative Summer Institute at Dover Sherborne High School. Summer 2001.** Lectured on deep sea hydrothermal vents, and presented possible laboratory exercises, to high school teachers.
- **Eyes to the Future Program, Fall 1999-2001.** Scientist mentor for young women in middle and high school.
- **REVEL Program, Fall 1997.** Trained two high school teachers to be research assistants on a research cruise to the Juan de Fuca Ridge.