

# Seana K. Davidson, Ph.D.

## Curriculum Vitae

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### EDUCATION HISTORY

Ph.D.	Marine Biology	UCSD, Scripps Institution of Oceanography	1999
Title: The Biology of the Bryostatins in the marine bryozoan <i>Bugula neritina</i> : Symbiosis, cryptic speciation and chemical defense.			
B.A.	Biology	University of Oregon, R. D. Clark Honors College	1990

### PROFESSIONAL HISTORY

2013	Research Associate Professor, University of Washington
2007-2013	Research Assistant Professor, University of Washington, Dept. of Civil and Environmental Engineering Seattle, WA
2001-2007	Senior Research Associate, University of Washington, Dept. of Civil and Environmental Engineering, Seattle, WA, D. A. Stahl laboratory.
1999-2001	NIH-NRSA Postdoctoral Fellow, U. of Hawaii, Pacific Biomedical Research Center, Manoa, HI, Prof. Margaret McFall-Ngai laboratory.
1995-1999	Sea Grant Trainee, Scripps Inst. of Oceanography, UCSD, La Jolla, CA, Prof. Margo Haygood
1993-1994	Regents Fellow, Scripps Inst. of Oceanography, UCSD, La Jolla, CA,
1990-1993	Research Assistant, University of Oregon, Inst. of Neuroscience, Eugene, OR

### AWARDS AND HONORS

National Research Service Award, 1999-2002, National Institutes of Health  
Student Speaker and travel grant recipient, 2000 American Society for Microbiology  
Graduate Fellowship, 1995-1999, California SeaGrant  
Regents Fellowship, 1993-94 SIO-UCSD  
Robert D. Clark Honors College Senior Fellowship 1990  
Phi Beta Kappa 1988

### MEMBERSHIPS AND SERVICE

International Symbiosis Society, 1997-present  
International Society of Earthworm Ecology 2010-present  
American Society for Microbiology, 1996-present  
International Society of Microbial Ecology, 2004-present

2013-present CEE Undergraduate Committee  
Reviews and editorial  
2013-present Editorial Review Board member Frontiers in Microbiology: Microbial Symbioses  
2007, 2010, 2012 NSF panelist  
2011 Joint Genome Institute review panel 2011-present Editorial Review Board member  
Environmental Microbiology Journal  
2002-present NSF proposal ad hoc reviewer (1-2 per year)  
2002-06 Applied and Environmental Microbiology editorial board

Current Reviewer for: Applied and Environmental Microbiology, PloS One (~ 2 per year),  
Pedobiology (2), Environmental Microbiology (3-5 per year), International Society for  
Microbial Ecology Journal (~2 per year), Invertebrate Biology (2), J Experimental Zoology  
(1-2), Cell Host and Microbes (1), Molecular Ecology (1-3).

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## PUBLICATIONS

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### Refereed archival journal publications

1. **Davidson, S. K.**, R. Powell, and S. W. James. (2013) A global survey of the bacteria within earthworm nephridia. *Mol. Phylo. and Evol.* 67: 188-200.
2. James, S. W. and **S.K. Davidson**. (2012) Molecular phylogeny of earthworms (Annelida: Crassiclitellata) based on 28S, 18S and 16S gene sequences. *Invertebrate Systematics* 26(2) 213-229.
3. Dulla, G.<sup>2</sup>, Go, R.<sup>3</sup>, Stahl, D.A. and **S.K. Davidson**. (2012) *Verminephrobacter eiseniae* type IV pili and flagella are required to colonize earthworm nephridia. *ISME J.* 6:1166–1175. published online Dec 15. doi:10.1038/ismej.2011.183.
4. **Davidson, S. K.**, R. J. Powell and D. A. Stahl. (2010) Transmission of a bacterial consortium in *Eisenia fetida* egg capsules. *Environmental Microbiology*. 12(8):2277-2288
5. Marie B. Lund, **S.K. Davidson**, M. Holmstrup, S. James, K.U. Kjeldsen, D. A. Stahl, A. Schramm. (2010) Diversity and host-specificity of the *Verminephrobacter*-earthworm symbiosis. *Environmental Microbiology*. 12(8):2142-2151
6. Steven L. Trabue, David A. Stahl, **Seana K. Davidson**, Hans Stein, Brian J. Kerr and Cherie J. Ziemer. (2009) Dietary Protein and Cellulose Effects on Chemical and Microbial Characteristics of Swine Feces and Stored Manure Published online Aug 2009; doi:10.2134/jeq2008.0039 *J Environ Qual* 38: 2138-2146.
7. Pinel, N., **S. K. Davidson** and D. A. Stahl. (2008) *Verminephrobacter eiseniae* gen. nov., sp. nov., a nephridial symbiont of the earthworm *Eisenia foetida* (Savigny). *Int J Syst Evol Microbiol* 58: 2147 – 2157. Featured on cover, cover image by S.K.D.
8. **Davidson, S. K.** and D. A. Stahl. (2008) Selective recruitment of bacteria during embryogenesis of an earthworm. *Int Soc Microbial Ecol* 2, 510-518.
9. K. H. Sharp, **S. K. Davidson**, and M. G. Haygood. (2007) Localization of “*Candidatus Endobugula sertula*” and the bryostatins throughout the life cycle of the bryozoan *Bugula neritina*. *Int Soc Microbial Ecol* 1: 693-702.
10. Stahl, D. A. and **S. K. Davidson**. (2006) Genomics: Blueprints for partnerships. *Nature* 443:925-927 News and Views.
11. **Davidson, S. K.** and D. A. Stahl. (2006) Transmission of nephridial bacteria of the earthworm, *Eisenia foetida*. *Appl. Environ. Microbiol.* 72(1):769-775.
12. Longstreth, W. T. Jr, J. S. Meschke, **S. K. Davidson**, L. M. Smoot, J. C. Smoot, and T. D. Koepsell. (2005) Hypothesis: a motor neuron toxin produced by a clostridial species residing in gut causes ALS. *Med Hypotheses* 64(6):1153-6.
13. **Davidson, S. K.**, T. A. Koropatnick, R. Kossmehl, L. Sycuro, and M. J. McFall-Ngai. (2004) NO means ‘yes’ in the squid-vibrio symbiosis: Nitric oxide during the initial stages of a beneficial association. *Cell. Microbiol.* 6:1139-1151 (*SKD image featured on cover*)
14. Schramm, A., **S. K. Davidson**, J. A. Dodsworth, H. L. Drake, D. A. Stahl, and N. Dubilier. (2003) Acidovorax-like bacterial symbionts in the nephridia of earthworms. *Environ. Microbiol.* 5(9):804-809. (*SKD image featured on cover*)
15. **Davidson, S. K.**, S. W. Allen, G. E. Lim, C. M. Anderson and M. G. Haygood. (2001) Evidence for the biosynthesis of bryostatins by the bacterial symbiont, “*Candidatus*

- Endobugula sertula", of the bryozoan *Bugula neritina*. *Appl. Environ. Microbiol.* **67**(10):4531-4537.
16. **Davidson, S.K.**, T. Koropatnick, R. Kossmehl, and MJ McFall-Ngai. (2001) Nitric oxide as a specificity determinant in the squid-Vibrio association. *American Zoologist*. **41**(6): 1423. Abst.
  17. Schmidt, E. W., A. Y. Obraztsova, **S. K. Davidson**, D. J. Faulkner, and M. G. Haygood. (2000) Identification of the antifungal peptide-containing symbiont of the marine sponge *Theonella swinhonis* as a novel δ-proteobacterium, "Candidatus Enttheonella palauensis." *Marine Biology*. **136**: 969-977.
  18. **Davidson, S. K.** and M. G. Haygood. (1999) Identification of sibling species of the bryozoan *Bugula neritina* that produce different anticancer bryostatins and harbor distinct strains of the bacterial symbiont "Candidatus Endobugula sertula." *Biol. Bull.* **196**:273-280.
  19. Haygood, M. G., E. W. Schmidt, **S. K. Davidson** and D. J. Faulkner. (1999) Microbial symbionts of marine invertebrates: opportunities for microbial biotechnology. *J. Mol. Microbiol. Biotechnol.* **1**(1):33-43.
  20. Haygood, M. G. and **S. K. Davidson**. (1997) Small subunit rRNA genes and in situ hybridization with oligonucleotides specific for the bacterial symbionts in the larvae of the bryozoan *Bugula neritina* and proposal of "Candidatus Endobugula sertula". *Appl. Environ. Microbiol.* **63**:4612-4616.
  21. Weeks, J. C., and **S. K. Davidson**. (1994) Influence of interganglionic interactions on steroid-mediated dendritic reorganization and death of proleg motor neurons during metamorphosis in *Manduca sexta*. *J. Neurobiol.* **25**:535-554.
  22. Weeks, J. C., **S. K. Davidson**, and B.H.G. Debu. (1993) Effects of a protein synthesis inhibitor on the hormonally mediated regression and death of motoneurons in the tobacco hornworm, *Manduca sexta*, *J. Neurobiol.* **24**:125-140.
  23. Weeks, J. C., B.H. G. Debu, and **S. K. Davidson**. (1991) Cycloheximide blocks the steroid-mediated death of proleg motoneurons during the metamorphosis of *Manduca sexta*. *Soc. Neurosci. Abstr.* **17**:229.

### Book Chapters

24. Stahl, D.A., J. Flowers, M. Hullar and **S.K. Davidson**. (*in press*) Chapter update The Structure and Function of Microbial Communities. The Prokaryotes, 4<sup>th</sup> edition.
25. Stahl, D. A., M. Hullar and **S. K. Davidson**. (2006) Chapter 1.13. The Structure and Function of Microbial Communities. The Prokaryotes, 3<sup>rd</sup> edition, 1:299-327.
26. Haygood, M. G., E. W. Schmidt, **S. K. Davidson** and D. J. Faulkner. (2000) Microbial Symbionts of Marine Invertebrates: Opportunities for Microbial Biotechnology. In: Molecular Marine Microbiology, Bartlett, D. ed. Horizon Scientific Press.
27. Haygood, M. G. and **S. K. Davidson**. (1998) Bacterial symbionts of the bryostatin-producing bryozoan *Bugula neritina*. In: New Developments in Marine Biotechnology, Y. Le Gal and H. Halvorson eds. Plenum Publishing Corp.

### Reports and articles

28. Article. Davidson, S.K. (2008) Bacterial symbionts within mobile soil bioreactors known as earthworms. ISS Symbiosis International. Issue No. 15:pg. 1-2.
29. Stahl, D. A., Davidson, S.K., and Ziemer, C. (2004 ) Analysis of GI Community Shifts in Response to Dietary Fiber. PDF Url. Accession Number: ADA433807. Final report DARPA.
30. Davidson, S.K. (1990) Raccoon foraging in the tidal flats of the Coos Estuary. Robert D.

Clark Honors College thesis. Advisors, Dr. James Carlton and Dr. Richard Everett.

**Publication citation indices:** citations: 1129 total; 551 since 2009; h-index=14; i10-index=16

### In preparation for submission within 1-6 months

1. Dulla, G., N. Pinel, R. Go, J. Barkley, and **S.K. Davidson**. The Earthworm Symbiont *Verminephrobacter eiseniae* mediates Natural transformation within the earthworm egg capsules using Type 4 Pili. (*final editing stages for submission to Frontiers Microbiology target date May 30, 2014*)
2. Dulla, G.F., R. A. Go, N. Pinel, and **S. K. Davidson**. Natural Transformation within biofilms formed by earthworm Symbiont *Verminephrobacter eiseniae*. (*target submission in July, 2014*)
3. Martinkosky, L., J. Barkley, H.L. Gough and **S.K. Davidson**. Stimulation of heavy hydrocarbon degradation by earthworm activities. (*Target submission date in June 2014*)
4. **Davidson, S.K.**, R. Powell, S.W. James. Diversity and co-divergence of nephridial symbionts within the earthworm family Lumbricidae. (*Target submission date Nov. 15, 2014*)
5. Pinel, N., K.U. Kjeldsen, S. Stolyar, M. B. Lund, **S. K. Davidson**, R. Parales, J. Penrod, J. Parales, M. J. Wargo, R. Walcott, O. Chertkov, H. E. Kiss, C.S. Han, A. Schramm, D. A. Stahl. Genome Composition and Evolution in the Earthworm Bacterial Symbiont *Verminephrobacter eiseniae*.

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### TEACHING, MENTORING AND PRESENTATIONS

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#### Courses

Planned for Fall 2014, Microbiology 301

Winter 2014, 498 I Writing workshop

Fall 2013, Microbiology 260 at North Seattle Community College

#### Science outreach activities

2013, Summer, Hosted minority undergraduate thorough the UW GenOM ALVA program, Eduardo Rojas.

2012 and '13 Pacific Science Center, PAWs on Science weekent, Interactive display: All about earthworms.

2012-present Facebook page for Earthworm Symbiosis (The Earthworm Symbiosis pages)

2008-09 Math and Science Leadership program, UW, day in the lab with 7<sup>th</sup> graders-first generation college bound under represented kids in a summer high school program implemented through the UW MESA (Mathematics Science Engineering and Achievement; <http://washingtonmesa.org/>).

#### Guest lectures and special courses

2012-14. Winter CEE/CE 498 Spec. Top. Course: Microbiology of Earth and Human Systems: co-taught with David Stahl, Seana Davidson, Mike Brett, John Leigh, John Mittler, Marina Kalyuzhnaya. Four lectures, assigned readings and assignments.

2013, Winter BBio393 Advanced Microbiology, at UW Bothell

Guest Lecturer, CEE 550 Microbial Process Fundamentals, Fall 2002-04; 2012-13.

Guest Lecturer, CEE 599 Microbial Genetics in Environmental Processes, Spring 2003-07; 2011.

2006 and 2009 Participated in collaborative teaching of two courses in Brazil at Universidade Positivo, Curitiba, and Universidade Federal de Minas Gerais, Belo Horizonte for Brazilian scientists, graduate and undergraduate students. Titled: Oligochaetes & Microorganisms:

biodiversity and molecular biology. Included 3 weeks in the field with scientists and students. This activity increased the ability of scientists and students to study their soil fauna using state-of-the-art methods.

### **Postdoctoral scientists/Research Scientists**

2013-present Shu-mei Jiang, Research Scientists  
2008-12 Glenn Dulla, NSF Minorities Postdoctoral Fellow  
2008-10 Jiancong Xu, Bioinformatics

### **Graduate students**

2013-Present Luke Martinkosky, M.S. student; Qiwen Chen, MS student  
2010-13 Jaimie Barkley CEE, PhD student (now employed at GeoEngineers).  
2010-12, Eric Naussaua, PhD student  
2011 Meghan Betcher, Master of Science committee, Oregon Graduate Institute, OHSU, Portland. Chair: M.G. Haygood.  
2008-09 Committees: Jeff Gabster CEE, M.S.; Erik Anderson CEE, M.S.  
2002-2009 Mentoring: Nicholas Pinel, U.W. Ph.D. student  
2002 Mentoring: Suzanne Verhaegh, visiting PhD student (6 mos), Wageningen University, Netherlands; Nina Jaffarzad, M.S. Texa State University, San Marcos, 2002  
2001 Pamela White, M.S. Texas State University, San Marcos, 2001

### **Undergraduate students**

Spr 2013-Spr 2014: Colin Butler (CEE), Kyuwoong Kim (Microbiology), Eduardo Rojas (GenOM ALVA fellowship awardee).  
2012-2013, three honors students worked as a team and presented at the Mary Gates Undergraduate Research Symposium. Adrian Diaz (Mol. Cell Bio); Meghan Spain (Microbiology, Honors); Kyuwoong Kim (Microbiology, Honors).  
2005-2012: mentored 10 UW undergraduates (8 women), teaching molecular biology, microscopy methods, and encouraging independent thinking. Includes two Mary Gates Undergraduate research fellows and support on NSF REU supplements: Mary Wang, Ruth Go(honors student), Wesley Tang (honors).

### **Invited lectures and seminars**

2014 Feb, invited seminar speaker UC Davis, Jonathon Eisen lab; May, Special topics seminar, University of Oregon, invited by Brenden Bohannan.  
2013 25<sup>th</sup> Anniversary of Squid-Vibrio symbiosis research meeting at University of Wisconsin, Madison, WI , Invited speaker.  
2012 International Symbiosis Society Congress, Krakow, Poland.  
2010 Invited Keynote Speaker International Symposium on Earthworm Ecology, Xalapa, Mexico.  
2009 **1.** Invited Speaker, International Symbiosis Society Congress meeting, Wisconsin; **2.** Sweden, Assembling the Tree of Life, the Clitellata, workshop and mini course. Invited by Crister Erseus, included scientists from U.S. and Sweden, and graduate students.  
2008 University of Washington, CEE seminar series  
2007 **1.** University of Montana, Missoula, Microbiology seminar series; **2.** University of Washington, CEE seminar series  
2006 **1.** Oregon Graduate Institute, Portland, OR. Department seminar series; **2.** Washington State Univeristy, Vancouver, WA.

- 2005 **1.** University of Washington Department of Microbiology Retreat; **2.** University of Washington, Dept. of Biology Seminar Series; **3.** Michigan State University, Microbiology and Molecular Genetics Seminar Series.
- 2004 August, 10<sup>th</sup> International Society for Microbial Ecology meeting. Seminar: S.K. Davidson. "Shifts in bacterial species profiles in the egg capsules of *Eisenia fetida* over the course of embryo development."
- 2000 Southwest Texas State University, Biology Seminar Series.
- 2000 May 21-25, American Society for Microbiology General Meeting, Los Angeles CA. Student travel grant winner and selected student speaker. S.K. Davidson, S.W. Allen, G.E. Lim, C. Anderson and M.G. Haygood. *Evidence that the bacterial symbiont Candidatus Endobugula sertula plays a role in bryostatin biosynthesis in the bryozoan Bugula neritina.*
- 1998 August 7, Invited speaker for Pacific Biomedical Research Center, University of Hawaii, Honolulu. Title: *Bugula neritina and its 'Endobugs': Sibling species and Chemotypes.*
- 1997 April 2, California State University, Fullerton, invited seminar speaker for Department of Biological Science seminar series

**Presentations given at conferences (Abstracts published in meeting program for each)**

- 2013 June, 25<sup>th</sup> Anniversary of Squid-Vibrio symbiosis research meeting at University of Wisconsin, Madison, WI. Seminar.
- 2012 **1.** July, International Symbiosis Society Congress, Krakow, Poland. G. Dulla, R. Go, N. Pinel, J. Barkley, D. A. Stahl, **S. K. Davidson.** **2.** Oct. 4th ASM Conference on Beneficial Microbes. Aggregation and natural transformation mediated by type four pili in the earthworm symbiont *Verminephrobacter eiseniae*.
- 2010 Sept., International Symposium on Earthworm Ecology: **1.** Keynote speaker: **S.K. Davidson**, R. Powell, and S. James. "Diversity of bacterial symbionts in earthworm nephridia." **2.** **G. Dulla**, R. Go, D. Stahl and S.K. Davidson. "Verminephrobacter eiseniae motility is required for proper colonization of *Eisenia fetida* nephridia."
- 2010 August, International Society for Microbial Ecology: **1.** **S.K. Davidson**, R. Powell, and S. James. "Diversification of earthworms and their microbial symbionts." **2.** **G. Dulla**, R. Go, D. Stahl and S.K. Davidson. "Two forms of Verminephrobacter eiseniae motility required for proper colonization of *Eisenia fetida* nephridia."
- 2009 August, Sixth International Society of Symbiosis. Four abstracts: **1.** Seminar: **S.K. Davidson.** "Earthworm acquisition of a bacterial consortium during embryogenesis." **2.** **G. Dulla**, R. Go, D. Stahl, and S. Davidson. "Verminephrobacter eiseniae recolonization of earthworm nephridia is hindered in the presence of a co-colonizing *Flexibacter* sp." **3.** **N. Pinel**, K. Kjeldsen, S.K. Davidson and D. Stahl. "Genomic insights into the symbiotic association between earthworms and Verminephrobacter spp." **4.** **M. Haygood**, S. Sudek, K. Sharp, S.K. Davidson, M. Hildebrand, G. Lim-Fong, C. Anderson, N. Lopanik, L. Waggoner, H. Liu, S. Allen, A. Patel, L. Regali, and D. Sherman. "The role of Endobugula species, specific bacterial symbionts of marine bryozoans in the genus Bugula, in the biosynthesis of defensive secondary metabolites."
- 2008 Oct., ASM Second Annual Conference on Beneficial Microbes, San Diego, CA. Two posters. **1.** **S.K. Davidson**, M.B. Lund, R. Powell, A. Schramm and S. James. "Global patterns of bacterial colonization in earthworm nephridia." **2.** **M. B. Lund**, M. Holmstrup, S.K. Davidson, A. Schramm. "Earthworms and their nephridial symbionts: co-diversification and maintenance of the symbiosis."
- 2006 Aug., Fifth International Symbiosis Society Congress, Vienna, Austria. Two presentations: **1.** Seminar: **S.K. Davidson.** "Symbiotic colonization during embryogenesis of the

- earthworm, Eisenia foetida.*" **2. K. Sharp**, Davidson, S.K., et al. "Chemical defense symbiosis in marine invertebrates: bryozoans and bacteria."
- 2005 May, ASM Conference on Beneficial Microbes, Lake Tahoe, CA. Two posters. **1. S.K. Davidson**, A. Schramm, F. An, and D.A. Stahl. "Bacterial symbionts of earthworm (*Eisenia foetida*) nephridia: Acidovorax-like bacteria, and discovery of a putative second bacterial symbiont." **2. K. Sharp**, S. Sudek, L. Waggoner, M. Hildebrand, S.K. Davidson, G. Lim, H. Liu, C. Anderson, and M. Haygood. "The Bugula neritina/E. sertula symbiosis: a model system for chemical defense symbiosis in marine invertebrates."
- 2004 Aug., 10<sup>th</sup> International Society for Microbial Ecology meeting. Two presentations. Seminar: **S.K. Davidson**. "Shifts in bacterial species profiles in the egg capsules of *Eisenia foetida* over the course of embryo development." Poster: **C.J. Zeimer**, S.K. Davidson, D.A. Stahl, and B.J. Kerr. "Comparison of microbial communities in cecal and fecal samples from pigs fed two levels of cellulose and protein."
- 2004 May, ASM 104th General Meeting, New Orleans **N. Pinel**, S.K. Davidson and D.A. Stahl. "Isolation and Characterization of a Novel Symbiotic Acidovorax species from the Renal Organs of the Earthworm *Eisenia foetida*."
- 2003 August, Fourth International Symbiosis Society Congress, Halifax, Nova Scotia. **S.K. Davidson**, A. Schramm and D.A. Stahl. "Transmission of Acidovorax sp. bacterial symbionts from parent to progeny of the earthworm *Eisenia foetida*."
- 2003 May, American Society for Microbiology, Washington D.C. **S.K. Davidson**, A. Schramm and D.A. Stahl. "Evidence for the vertical transmission of Acidovorax sp. bacterial symbionts of the earthworm *Eisenia foetida*."
- 2002 Society for Comparative and Integrative Biology Annual Meeting, Selected speaker. **Davidson, S.K.**, T. Koropatnick, R. Kossmehl, and M.J. McFall-Ngai. "Nitric Oxide as a Specificity Determinant in the squid-Vibrio association."
- 2001 May, American Society for Microbiology, General Meeting, Orlando, FL. **S. K. Davidson**, R. Kossmehl, and M. McFall-Ngai. "Running the Gantlet: Nitric Oxide Production in the Light Organ Duct is a possible Chemical Barrier to Nonspecific Colonization of the Host Squid Tissue."
- 2000 May, American Society for Microbiology General Meeting, Los Angeles CA. Student travel grant winner and selected student speaker. **S.K. Davidson**, S.W. Allen, G.E. Lim, C. Anderson and M.G. Haygood. "Evidence that the bacterial symbiont *Candidatus Endobugula sertula* plays a role in bryostatin biosynthesis in the bryozoan Bugula neritina."
- 1999 August, American Society for Microbiology, Conference on Microbial Biodiversity, Chicago, Illinois. **S.K. Davidson**, S.W. Allen, G.E. Lim, and M.G. Haygood. Poster title: "Evidence for the biosynthesis of bryostatins by the bacterial symbiont of the bryozoan Bugula neritina."
- 1998 February, Gordon Research Conference in Marine Natural Products, Ventura, CA. S. K. Davidson and M. G. Haygood. Poster title: "Nature or Nurture: Bryostatin variation in the bryozoan Bugula neritina has a genetic basis."
- 1998 February, American Geophysical Union, Ocean Sciences meeting, San Diego, CA. **S. K. Davidson** and M. G. Haygood. Published abstract and poster title: "Nature or Nurture: Bryostatin variation in the bryozoan Bugula neritina has a genetic basis."
- 1997 April, Second International Congress on Symbiosis, Woods Hole, Massachusetts. Seminar "Bacterial symbionts of the bryozoan Bugula neritina: phylogenetic affiliations, species-specific probes and possible role for the symbiont."