# Rachel Marine

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**RESEARCH INTERESTS**:

Environmental Microbiology, Microbiome, Next Generation Sequencing, Metagenomics, Bioinformatics

**EDUCATION:**

**Doctor of Philosophy** **2009-Dec 2015 (expected)**
University of Delaware, Newark DE
Department: Biological Sciences
Advisors: K. Eric Wommack, Ph.D. & Shawn W. Polson, Ph.D.
Dissertation Title: An exploration of aquatic phage communities through shotgun metagenomic sequencing; examining methodologies, novel phage genes and fine-scale community dynamics

**Bachelor of Science,** *summa cum laude* **2005-2009**
Salisbury University, Salisbury MD
Major: Biology
Minor: Chemistry

**HONORS/AWARDS:**

ASM Student Travel Award (2015)
University of Delaware Dissertation Fellowship (2014- 2015)
University of Delaware Graduate Fellowship (2013- 2014)
Special Teaching Conference Travel Fellowship (2013)
Institute of Soil and Environmental Quality Fellowship (2009-2012)
Henson Scholar (2007-2009)
Salisbury University Student Academic Research Award (2008)
Phi Kappa Phi Induction (2008)
Tri Beta Induction (2008)
Salisbury University Academic Scholarship (2005-2009)
New Jersey Board of Realtors Scholarship (2005, 2006)
Outstanding Chemistry Student, American Chemical Society (2005)

**PEER-REVIEWED PUBLICATIONS:**

1) **Marine, R**., McCarren, C., Vorrasane, V., Nasko, D., Polson, S., Wommack, K.E. 2014. Caught in the middle with multiple displacement amplification: the myth of pooling as a means to avoid amplification bias in a metagenome. *Microbiome*. 2:3.
2) Ng., T.F., **Marine, R.,** Wang, C., Simmonds, P., Kapusinkszky, B., Bodhidatta, L. Bamidele, S.O., Wommack, K.E., Delwart, E. 2012. High

variety of known and new RNA and DNA viruses of diverse origins in untreated sewage. *Journal of Virology.* 86(22):12161-12175.

3) **Marine, R**., Polson, S.W., Ravel, J., Hatfull G., Russell, D., Sullivan, M., Syed, F., Dumas, M., Wommack, K.E. 2011. Evaluation of a transposase protocol for rapid generation of shotgun libraries from nanogram quantities of DNA. *Applied and Environmental Microbiology.* 77(22):8071-8079.

**MANUSCRIPTS IN PREPARATION OR UNDER REVIEW:**

1) **Marine, R,** Polson, S., Wommack, K.E. 2015. Novel phage-encoded chaperonin genes are prevalent in aquatic viromes. In prep.

**PROFESSIONAL EXPERIENCE:**

***Research/Work Experience***

**Graduate Fellow/Research Assistant** **2009-2012, 2013-current**

Department of Biological Sciences, University of Delaware, Newark DE

- **Dissertation Project**: Worked with Dr. K Eric Wommack and Dr. Shawn Polson on examining the applicability and biases of library preparation techniques in microbial metagenomic analyses, as well as the application of metagenomics to studying virioplankton diversity and temporal dynamics. This involved the preparation metagenomic and amplicon libraries for DNA sequencing and bioinformatic/ phylogenetic analyses on resulting data.
- **Laboratory Techniques**: field sampling, bacteria and virus isolation, DNA/RNA extraction and purification, gel electrophoresis, pulsed-field electrophoresis, gel extraction, flow cytometry, epifluorescence microscopy, PCR, qPCR, DNA shearing (Covaris), genomic/metagenomic library preparation
- **Computational Techniques**: Data analysis included running a variety of command-line tools and software including custom perl scripts, CLC, Geneious, QIIME, SamTools, USearch, PhyML, RAXmL, FastTree and BLAST. Computational work was analyzed using a high performance computing cluster at the University of Delaware. Statistical work was performed using R, JMP and Past3.
- SOP writing, including protocol for virus purification from aquatic samples
- Managed laboratory functions including ordering, supplies organization and lab safety

**General Biotechnician** **Summer 2008**

Assateague Island National Park
Berlin, MD 21811

- Duties included water quality monitoring, mosquito monitoring, protection of endangered plant species and removal of invasive plant species

**Cellular Biology Laboratory Assistant** **2007-2009**

Department of Biological Sciences, Salisbury University, Salisbury MD

- Responsible for setting up equipment and chemicals/solutions needed to perform Cellular Biology laboratory experiments

**SU Chemistry Internship, DoD Grant** **Summer 2007**
Department of Chemistry
Salisbury University, Salisbury MD
- Synthesized a potential prostate cancer prodrug
- **Laboratory Techniques**: chemical extraction, NMR, thin layer chromatography, rotary evaporation
- Developed basic research skills such as managing a scientific notebook, laboratory safety and reading scientific papers

***Teaching/Mentoring Experience***

**Teaching Assistant, BISC104 (Principles of Biology)** **2012-2013**
Department of Biological Sciences
University of Delaware, Newark DE
- Laboratory instructor for 2-3 lab sections of BISC104 per semester
- Graded assignments and met with students who needed additional help

**Group Tutor, BISC104** **2012-2013**
Office of Academic Enrichment
University of Delaware, Newark DE
- Taught weekly tutoring sessions for students enrolled in BISC104

**Mentor, Summer Scholars Program** **2012-2014**
Undergraduate Research Program
University of Delaware, Newark DE
- Guided research projects for four summer interns
- Instructed students on fundamental laboratory skills and organization

**Volunteer, DBI Outreach Program** **2011-2014**
- Assisted in outreach activities at the Delaware Biotechnology Institute for visiting middle school and high school students including hands-on scientific activities, Q&A panels and building tours
- Served as a judge for the 2012 Sussex County Science Fair/Delaware BioGENEius Challenge

**PRESENTATIONS/POSTERS:**

1) **Marine, R.***, Polson, S.W., Wommack, K.E. You gotta know how to fold 'em: Novel chaperonins are prevalent in the virioplankton and reveal the presence of marine archaeal viruses. General Meeting of the American Society for Microbiology. May 30- June 2, 2015. New Orleans, LA. *(Poster)*

2) Harrison, A.*, **Marine, R**., Polson, S.W., Wommack, K.E. Watching the clock: Estuarine virioplankton populations demonstrate rapid changes in abundance. 5th Annual Undergraduate Research and Service Celebratory Symposium. August 14, 2014. Newark, DE. *(Poster)*
3) McCarren, C.*, **Marine, R**., Fadrosh, D., Ma, B., Polson, S.W., Wommack, K.E. Dynamics of estuarine bacterioplankton populations over a single day. 4th Annual Undergraduate Research and Service Celebratory Symposium. August 8, 2013. Newark, DE. *(Poster)*
4) **Marine, R**.*, Nasko, D., Williamson, S., Polson, S., Wommack, K.E. High resolution shotgun metagenomic analysis of diel virioplankton dynamics. 14th International Symposia on Microbial Ecology. August 19-24, 2012. Copenhagen, Denmark. *(Poster)*
5) McCarren, C.*, Vorrasane, V., **Marine, R**., Wommack, K.E. Assessment of PacBio sequencing for viral shotgun metagenomics. 3rd Annual Undergraduate Research and Service Celebratory Symposium. August 9, 2012. Newark, DE. *(Poster)*
6) **Marine, R*.** Shotgun metagenomics as a window on virioplankton dynamics. Center for Environmental Genomics Metagenomics Workshop. Dec. 16, 2011. Lewes, DE. *(Presentation)*
7) **Marine, R**.*, Polson, S.W., Ravel, J., Hatfull G., Russell, D., Sullivan, M., Syed, F., Dumas, M., Wommack, K.E. Less is more: Evaluation of a low input, transposase-mediated protocol for rapid generation of high-throughput sequence libraries. General Meeting of the American Society for Microbiology. May 21-24, 2011. New Orleans, LA. *(Poster)*
8) **Marine, R.***, Mitchell, M. Synthesis of tripartate prodrug and antiprostatic testing with PSA-secreting and non PSA-secreting cell lines. National Conference on Undergraduate Research. April 9-12, 2008. Salisbury, MD. *(Presentation)*

**CURRENT PROFESSIONAL SOCIETIES/ORGANIZATIONS:**
American Society for Microbiology (ASM)
International Society for Microbial Ecology (ISME)