

# Rebecca Hochstein, PhD

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Passionate, self-motivated Microbiology and Immunology PhD with an environmental microbiology and virology emphasis

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## EDUCATION

Montana State University – Bozeman, MT  
**PhD in Microbiology and Immunology, 2015**

St. Olaf College – Northfield, MN  
**BA in Biology, 2006**

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## SKILLS AND TECHNIQUES

### Molecular Biology

- DNA isolation from viruses, bacterial, and archaea
- PCR, primer construction, and cloning
- Genomic library construction

### Genomics

- Sanger DNA sequencing
- Illumina deep sequencing
- Genome assembly and annotation
- Bioinformatics
- Geneious and Sequencher software

### Biochemistry

- Protein expression and purification in *E. coli* and *S. solfataricus*
- X-ray crystallography
- SDS-PAGE
- Western blotting
- Size exclusion chromatography
- Immunolocalization

### Microbiology

- Culturing of aerobic and anaerobic bacteria and archaea
- Enrichment culturing from hot spring environmental samples

### Microscopy

- Light microscopy
- Fluorescence microscopy
- Transmission electron microscopy
- Scanning electron microscopy

### Environmental Virology

- Isopycnic and differential ultracentrifugation
- Quantitative PCR assay development

### Other

- Microsoft Office software
  - Scientific literature research
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## EXPERIENCE

**Postdoctoral researcher** – University of Minnesota, St. Paul, MN, August 2016 – present

- Under the direction of Dr. Valery Forbes and Dr. Mike Sadowsky, I am investigating the gut microbiome of the marine worm *Capitella teleta*, an opportunistic marine polychaete often found at high densities after oil spills and in association with other organic pollution.

**Graduate research assistant** – Montana State University, Bozeman, MT. 2008 – 2015

- Under the direction of Dr. Mark Young, I developed culture-independent methods to discover and characterize two new archaeal viruses out of hot springs in Yellowstone National Park. An interdisciplinary approach combined microbiology, molecular biology, biochemistry, and x-ray crystallography to connect virus genomes to virus particles and hosts, including the in depth study of a virus major coat protein.

**Graduate teaching assistant** – Montana State University, Bozeman, MT. 2010 – 2011

- Teaching assistant for a general microbiology lab. Taught students basic microbiology skills, including culturing, microscopy, staining, metabolic testing, and scientific writing.

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## EXPERIENCE, CONT.

**Laboratory manager / Technician** – Lucigen Corporation, Middleton, WI. July 2006 – July 2008

- Constructed and implemented functional screens of genomic libraries and assisted in the development and testing of products related to molecular biology, molecular cloning, and biofuels. Trained and supervised undergraduate interns. Ordered supplies for the research and development lab.

**Merck/AAAS Undergraduate Science Research program** – St. Olaf College, June 2005 – August 2005

- Developed methods to analyze mussel tissue for phthalate esters and other hydrophobic chemicals using solid phase extraction, column extraction, and GC/MS, and Performed freshwater mussel transect surveys above and below wastewater treatment facility outfalls

**Minnesota Statewide Mussel Survey Internship** – Minnesota Department of Natural Resources, June 2004 – August 2004

- Surveying and data collection, including age and species determination, of freshwater mussels in rivers and creeks throughout Minnesota using SCUBA and snorkeling.

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## FELLOWSHIP

**National Science Foundation Integrative Graduate Research and Education Traineeship.** Montana State University, Bozeman, MT. 2008 - 2010

- Interdisciplinary research project focusing on geobiological systems. Used knowledge of microbial metabolic pathways and in silico network analysis to analyze a hot spring microbial community.

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## PEER REVIEWED PUBLICATIONS

*Acidianus* tailed spindle virus: a new archaeal large tailed spindle virus discovered by culture-independent methods.

**Hochstein, R.**, Amenabar, M., Munson-McGee, J., Boyd, E.S., and Young, M.J. 2016. *Journal of Virology*. 90(7):3458-3468.

- Chosen as a spotlight article in *Journal of Virology*
- Covered by MSU News University Communications:  
<http://www.montana.edu/news/15953/msu-researchers-develop-new-process-for-discovering-viruses>

Large Tailed Spindle Viruses of Archaea: a New Way of Doing Viral Business. **Hochstein, R.**, Bollschweiler, D., Engelhardt, H., Lawrence, CM., and Young, M. 2015. *Journal of Virology* 89(18):9146-9149

A new model of virus assembly by a large spindle-shaped archaeal virus. **Hochstein, R.**, Bollschweiler, D., Lintner, N., Eilers, B., Dharmavaram, S., Klug, W., Engelhardt, H., Baumeister, W., Young, M., and Lawrence, M. In preparation.

Wirth, J., Snyder, J., **Hochstein, R.**, Ortmann, A., Willits, D., Douglas, T., and Young, M. 2011. Development of a genetic system for the archaeal virus *Sulfolobus* turreted icosahedral virus (STIV). *Virology* 415(1):6-11.

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## PEER REVIEWED PUBLICATIONS, CONT.

Complete Genome Sequence of *Paenibacillus* strain Y4.12MC10, a Novel *Paenibacillus lautus* strain Isolated from Obsidian Hot Spring in Yellowstone National Park. Mead, D., Lucas, S., Copeland, A., Lapidus, A., Cheng, J., Bruce, D., Goodwin, L., Pitluck, S., Chertkov, O., Zhang, X., Detter, J., Han, C., Tapia, R., Land, M., Hauser, L., Chang, Y., Kyrpides, Ivanova N., Ovchinnikova, G., Woyke, T., Brumm, C., **Hochstein, R.**, Schoenfeld, T., Brumm, P. Standards in Genomic Sciences. 2012 July 30; 6(3): 381–400

Brumm, P., Hermanson, S., **Hochstein, R.**, Boyum, J., Hermersmann, N., Gowda, K., Mead, D. 2011. Mining *Dictyoglomus turgidum* for Enzymatically Active Carbohydrases. Applied Biochemistry and Biotechnology 163(2):205-214.

Dhodda, V., Godiska, R., VanWye, J., Mead, D., **Hochstein, R.**, Sheets, L., Vande Zande, S., Niebauer, C., Crawford, D., and Oleksiak, M. 2010. ExCyto PCR Amplification. PLoS ONE 5(9):e12629.

Godiska, R., Mead, D., Dhodda, V., Wu, C., **Hochstein, R.**, Karsi, A. Usdin, K., Entezam, A., and Ravin, N. 2010. Linear plasmid vector for cloning of repetitive or unstable sequences in *Escherichia coli*. Nucleic Acids Research 38(6):e88.

Godiska, R., Mead, D., Dhodda, V., **Hochstein, R.**, Karsi, A., Ravin, N., and Wu, C.. 2009. Book Chapter: Bias-Free Cloning of "Unclonable" DNA for Simplified Genomic Finishing (in the book DNA Sequencing III: Dealing with Difficult Templates). Jones and Bartlett.

Reysenbach, A., Hamamura, N., Podar, M., Griffiths, M., Ferreira, S., **Hochstein, R.**, Heidelberg, J., Johnson, J., Mead, D., Pohorille, A., Sarmiento, M., Schweighofer, K., Seshadri, R., and Voytek, M. 2009. Complete and Draft Genome Sequences of Six Members of the *Aquificales*. Journal of Bacteriology. 191(6):1992-1993.

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## ORAL PRESENTATIONS

**Thermal Biology Institute seminar series.** December 8, 2014. Closing the viral metagenomic loop. Montana State University

**10<sup>th</sup> international congress on Extremophiles.** Saint Petersburg, Russia. September 7-11, 2014. *Acidianus* tailed spindle virus: a new virus from Yellowstone's hot springs.

**American Society for Virology 31<sup>th</sup> Annual Meeting.** Colorado Springs, CO. June 21-25, 2014. A tale of two viruses: the unconventional hunt for new archaeal viruses.

**American Society for Virology 30<sup>th</sup> Annual Meeting,** Minneapolis, MN, July 16-20, 2011. Structural proteins as tools for archaeal virus isolation and characterization

**American Society for Virology 29<sup>th</sup> Annual Meeting,** Bozeman, MT, July 17-21, 2010. Development of culture-independent methods to isolate viruses from extreme environments.

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## POSTER PRESENTATIONS

**11<sup>th</sup> International Conference on Thermophile Research.** Big Sky, MT. September 11-16, 2011. Rebecca Hochstein, Nathanael Lintner, Jamie Snyder, Ben Bolduc, Martin Lawrence, Mark Young. Viral metagenomics and structural analysis as tools for discovery and isolation of archaeal viruses

**Northwest Crystallography Workshop.** Bozeman, MT. July 20-22, 2012. **Rebecca Hochstein**, Nathanael Lintner, Jamie Snyder, Ben Bolduc, Martin Lawrence, Mark Young. Structure-based approach to finding new *Archaeal* viruses from high temperature environments

**American Society for Virology 31st Annual Meeting,** Madison, WI, July 21-25, 2012. **R. Hochstein**, M. Lawrence, B. Bothner, N. Lintner, B. Bolduc, P. Manrique, M. Young. Searching for new *Archaeal* viruses from thermophilic environments

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## AWARDS

**American Society for Virology travel award.** 2012

**Thermal Biology Institute travel award.** 2014

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## REFERENCES

**Mark Young** – Professor of Plant Science and Plant Pathology, Montana State University  
Relationship: Academic advisor for my PhD  
myoung@montana.edu  
(406) 994-4966 (work)  
(406) 581-6549 (cell)

**Martin Lawrence** – Professor of Chemistry and Biochemistry, Montana State University  
Relationship: Co-advisor for my PhD  
lawrence@chemistry.montana.edu  
(406) 994-5382 (work)

**David Mead** – Founder and former CEO of Lucigen Corporation, current cofounder and CEO of Varigen Biosciences  
Relationship: Direct supervisor at Lucigen  
dmead@varigenbio.com  
(608) 444-9518 (work)