



Graham F. Hatfull
Lead Scientist

Welcome to the SEA-PHAGES Annual Symposium, and this special issue of Message in a Bottle. This issue discusses highlights from the year and program developments being discussed at the symposium. It is a special pleasure to welcome faculty members from our 17 new Cohort 8 schools, and we hope they enjoy meeting fellow faculty and students. We have sought to better define what it means to be a participating SEA-PHAGES member, and a list of benefits and responsibilities is available at <http://seaphages.org>. Hopefully you will find this site a go-to place for program information and to keep in touch with other SEA-PHAGES faculty and students. Perhaps most importantly, the scientific discoveries are moving forward at an amazing pace as reflected in publications this year, most notably the extensive comparative genomics reported in *eLIFE*. This also marks a refinement of our overall scientific direction, as we spread our wings and begin to explore phages of other hosts in the phylum Actinobacteria including those of *Arthrobacter*, *Rhodococcus*, *Dietzia*, *Gordonia*, *Mycobacterium*, *Nocardia*, *Tsukamurella*, and *Corynebacterium*, to name a few. We look forward to tapping into these riches in the years ahead.

STAY IN TOUCH IN THE SEA



The two major websites associated with the SEA-PHAGES program, PhagesDB.org and seaphages.org, continue to be actively developed. PhagesDB recently transformed from the “Mycobacteriophage database” to the “Actinobacteriophage database.” Now, data for all phages

of Actinobacterial hosts can be stored in a single location—in line with the scientific focus of the program—leading to richer BLASTs, Phamerator databases, Clusters, collaborations, and hopefully new discoveries!

The SEA wiki will continue to be phased out, and will meet its end during the coming academic year in favor of seaphages.org. Several key wiki features (the Faculty Lounge, meeting information, sequencing/archiving updates) have already been added to seaphages.org, and many more.

NEW ACTINOBACTERIA HOSTS FOR FALL 2015



This fall, we will continue to make additional hosts from the phylum Actinobacteria available for phage isolation. SEA-PHAGES faculty can volunteer to participate in all steps of this endeavor, from testing growth conditions for new hosts to isolating and characterizing phages. Intermittently, data will be gathered from participants, collated, reviewed and shared with all SEA-PHAGES faculty. As we identify best practices for working with each new host, protocols will be developed and distributed for classroom implementation across the SEA. Guidelines for

host selection and ordering, as well as preliminary data gathered by SEA-PHAGES faculty, staff, and students, will become available at seaphages.org and PhagesDB.org soon. Watch this space!

IMPORTANT DATES

- **June 12-14, 2015**
Annual Symposium at JRC
- **June 15-17, 2015**
Advanced Bioinformatics Workshop at HHMI HQ
- **June 21-27, 2015**
In situ workshop A at UMBC
- **July 12-18, 2015**
In situ workshop B at UMBC
- More at seaphages.org

Did you know?

How do you distinguish between a phage-resistant mutant and a lysogen?

It is fairly easy to isolate resistant cells from any phage infection—given the millions of both phage and bacteria involved in any one plaque the chance of a random mutation conferring resistance is quite high. So how do you tell the difference between a bacterial line that is now resistant to further infection from your phage due to random mutations, and a true lysogen, with a stably maintained prophage? One way is to test your liquid cultures: lysogens “leak” phages into the supernatant when grown in liquid culture, even after multiple rounds of streak purification on plates. Another is to patch your lysogen onto a plate, overlay with soft top agar and sensitive cells, and look for clearing (due to phage activity) around the patch. However, the gold standard is the ability to amplify the attL or attR region of the lysogen using PCR.

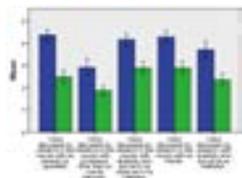
SEA-PHAGES TEAMS: GIFT, SM*ART, AND SWIFT



The Genome Inspection and Finishing Team assembled and reviewed an impressive 76 genomes from December 2014-February 2015. The slightly obsoletely-named SEA-PHAGES Mycobacteriophage* Annotation Review Team reviewed and submitted more than 60 genomes to GenBank over the summer of 2014, and worked hard to develop new annotation submission guidelines to improve the quality of all annotations across the SEA. SM*ART has doubled in size to ten members this year to handle the increase in annotation submissions, and has already submitted 25 genomes to-date in 2015. The SWIFT (Summer Workshop In Situ Faculty Team) is hard at work setting up for two In Situ training workshops this summer at UMBC for 17 new schools in Cohort 8. We are piloting a new model that capitalizes on faculty expertise in training and dissemination of concepts, techniques and pedagogy. We would like to encourage faculty at all experience levels to participate in the future!

*mycobacteriophage now = actinobacteriophage

ASSESSMENT



The SEA-PHAGES assessment team of David Hanauer and Mark Graham are using a models-to-methods approach to develop an informed process of evaluation and assessment. A detailed model of the program was developed which widened the scope to include issues of faculty training, student outcomes and persistence in the sciences. These components will be addressed through a series of validated assess-

ment instruments in the coming year. The aim is to have a deeper understanding of the program and ways in which it works. Formative assessments beneficial to teaching are being developed by SEA-PHAGES faculty with the support of the assessment team, and look forward to working with all faculty.

SOFTWARE



The Signals app allows students and faculty to easily tag soil collection sites, interact with other SEA-PHAGES members, and access the “Sounds of the SEA” podcast. It has been renamed the “SEA-PHAGES” app and is now available under that name on Google Play. The app is currently undergoing Apple’s review process and should be available very soon on the App Store. A desktop version can be found at <http://seaphages.csm.jmu.edu:3000/>. Symposium attendees are especially encouraged to check it out!

Work also continues on the web version of Phamerator. A pilot is planned for the Spring 2016 semester, though the SEA-PHAGES virtual machine will also be fully supported during this time.

SEA HIGHLIGHTS

Congratulations to Seton Hill University SEA-PHAGES students Sarah Sokol and Minnu Suresh for winning the Distinguished Honors Capstone Project award from the Honors College for their work with phage sequencing!

2014-2015 SEA-PHAGES Faculty Teams:

GIFT

Aaron Best
J. Alfred Bonilla
Randy DeJong
Nick Edgington
Marianne Poxleitner

Allison Johnson
Rodney King
Jen Schaff

SM*ART

Kirk Anders
Sarah Ball
Maggie Braun
Veronique Delesalle
Lee Hughes

Karen Klyczek
Eric Miller
Sally Molloy
Shallee Page
Vassie Ware

SWIFT

Kristen Butela
Nick Edgington
Emily Fisher
Anna Hull
Sharon Isern*
Katie Mageeny
Scott Michael*
Tanya Riddick
Carl Urbinati
Jackie Washington

*course director

PUBLICATIONS OF INTEREST

• Pope et al (2015)

Whole genome comparison of a large collection of mycobacteriophages reveals a continuum of phage genetic diversity” *eLife* 4:e06416.

• Hatfull, GF (2015)

Dark matter of the Biosphere: The amazing world of bacteriophage diversity. *J Virol.* 477 pii: JVI.01340-15

• Hatfull, GF (2015)

Innovations in Undergraduate Science Education: Going Viral *J.Virol* 477 pii: JVI.03003-14.

• Mehla et al (2015)

The protein interactome of mycobacteriophage Giles predicts functions for unknown proteins. *J Bacteriol.* pii: JB.00164-15

• Petrova et al (2015)

Mycobacteriophage-repressor mediated immunity as selectable genetic markers: Adephtagia and BPs repressor-selection. *Microbiology, in press*

THE SEA-PHAGES TEAM:

Graham Hatfull (Pitt)
David Asai (HHMI)
Billy Biederman (HHMI)
Kevin Bradley (HHMI)
Steve Cresawn (JMU)
Debbie Jacobs-Sera (Pitt)
Crystal Petrone (Pitt)
Welkin Pope (Pitt)
Dan Russell (Pitt)
Vic Sivanathan (HHMI)



SEA-PHAGES: A community of researchers exploring phage diversity

Message in a Bottle
For more information
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