Fundamentals of Basic and Applied Phage Biology

12-16 May 2025, Biology Department, Lund University, Lund, Sweden

Monday May 12, 2025

Course Introduction

11:30-12:00	Course Introduction Vasili Hauryliuk, Lund University, Sweden
12:00-12:45	**Lunch**

Lecture

Chair: Vasili Hauryliuk, Lund University, Sweden

13:00-13:45	*Bacteriophages – from the fundamentals of molecular biology to the BASEL collection* Alexander Harms, Department of Health Sciences and Technology, ETH Zürich, Switzerland
13:45-14:00	Questions and discussion

Lab work: Environmental phage isolation

14:00-15:00	Collection of environmental samples across the town
15:00-15:30	Phage isolation from environmental samples (first steps)
15:30-15:45	**Coffee break**
15:45-17:00	Phage isolation from environmental samples (continued)

Lecture

Chair: Vasili Hauryliuk, Lund University, Sweden

17:00-17:45	*Oh no. My gut microbiome got a virus infection. The role of the gut virome in health and disease – and how to study it* Dennis Sandris Nielsen, University of Copenhagen, Denmark
17:45-18:00	Questions and discussion
18:30	**Dinner**

Tuesday May 13, 2025

Lab work: phage isolation continues, and immunity escaper isolation starts

9:00-9:30	Picking plaques from the environmental isolation plates and re-streaking (phage purification step Nr 1)
9:30-11:00	Isolation of immunity escape mutants: phage infections of resistant strains to generate escape plaques

Lecture

Chair: Marcus Johansson, Lund University, Sweden

11:00-11:45	*Phage-bacteria evolution experiments - a powerful tool to watch evolution in action* Carolin Wendling, LMU Munich, Germany
11:45-12:00	Questions and discussion

12:00-12:45 Lunch

Lectures

Chair: Marcus Johansson, Lund University, Sweden

13:00-13:45	*Resistance to phages and antibiotics: Challenges and possibilities* Hanne Ingmer, University of Copenhagen, Denmark
13:45-14:00	Questions and discussion
14:00-14:45	*Engineered and CRISPR-armed phages as therapies against AMR bacteria* Emre Gençay, SNIPRBIOME, Denmark
14:45-15:00	Questions and discussion

15:00-15:15 Coffee break

15:15-16:00	*Life after infection: the story of* Bacillus subtilis *lysogens* Anna Dragoš, University of Ljubljana, Slovenia
16:00-16:15	Questions and discussion
16:15-17:00	*Bacteriophage isolation and engineering for clinical applications* Antonia Sagona, University of Warwick, the UK
17:00-17:15	Questions and discussion
17:15-18:00	Presentations by students (1-slide elevator pitch)

18:30 Dinner

Wednesday May 14, 2025

Lab work: Single-plaque purification of environmental phages and escape mutants

9:00-9:30	Restreaking individual plaques of environmental isolates (purification step Nr 2)
9:30-10:00	Restreaking individual plaques of escape mutants (purification step Nr 1)

Lectures

Chair: Ilya Terenin, Lund University, Sweden

10:00-10:45	*Fighting* Pseudomonas *phages* Stan J.J. Brouns, Delft University of Technology, Netherlands
10:45-11:00	Questions and discussion
11:00-11:45	*Phage vs host interactions* Rob Lavigne, University of Leuven, Belgium
11:45-12:00	Questions and discussion
12:00-12:45	**Lunch**

Lectures

Chair: Ilya Terenin, Lund University, Sweden

13:00-13:45	*Exploiting phage for SynBio applications in non-model bacteria* Rob Lavigne, University of Leuven, Belgium
13:45-14:00	Questions and discussion
14:00-14:45	*Bacteriophages and plant-associated microbes* Lars Hestbjerg Hansen, University of Copenhagen, Denmark
14:45-15:00	Questions and discussion
15:00-15:15	**Coffee break**
15:15-16:00	*The biology of CRISPR-Cas: adaptive immunity in prokaryotes* Rafael Pinilla-Redondo, University of Copenhagen, Danmark
16:00-16:15	Questions and discussion
16:15-17:00	*Xenogeneic regulation of the bacterial transcription machinery* Sivaramesh Wigneshweraraj, Imperial College London, the UK
17:00-17:15	Questions and discussion
18:30	**Dinner**

Thursday May 15, 2025

Lab work: Preparation of phage working stock, determination of phage titre, confluence plates

9:00-9:30	Streaking the phage escape mutants into single plaques (purification step Nr 2)
9:30-12:00	Preparation of the phage lysate (working stock) from environmentally isolated phages, determination of phage titer for environmentally isolated phages

12:00-12:45 **Lunch**

Lectures

Chair: Karin Ernits, Lund University, Sweden

13:00-13:45	*Phage therapy in Belgium* Jean-Paul Pirnay, Laboratory for Molecular and Cellular Technology, Queen Astrid Military Hospital, Brussels, Belgium
13:45-14:00	Questions and discussion
14:00-14:45	*Insane in the membrane, safe in the cell: the examples of Kiwa and Tmn* Franklin Nobrega, University of Southampton, the UK
14:45-15:00	Questions and discussion

15:00-15:15 **Coffee break**

15:15-16:00	*A dive into the Argonaute world – Immunity through a wide variety of mechanisms* Daan Swarts, Wageningen University, the Netherlands
16:15-17:00	*Bioinformatic tools for visualising and comparing phage genomes* Gemma C. Atkinson, Lund University, Sweden
17:00-17:15	Questions and discussion

Lab work: assessing the results of the morning experimental session

17:15-17:45	Looking at the plates

18:30 **Dinner**

Friday May 16, 2025

Lab work: Preparation of phage escape mutant stocks, analysis of the results

9:00-11:00	Making the working stock of the escaper mutants, cleaning up the lab
11:00-12:00	Discussion and data analysis of both the actual data and theoretical aspects of the course (oral examination) Vasili Hauryliuk, Lund University, Sweden
12:00-12:45	**Lunch**
13:00-13:45	Course evaluation
13:45	**Departure**