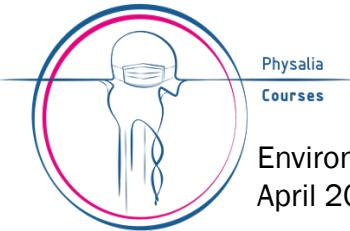


Environmental metagenomics

Course outline and practical info



Environmental metagenomics
April 2022

Igor S. Pessi & Antti Karkman, University of Helsinki

About us

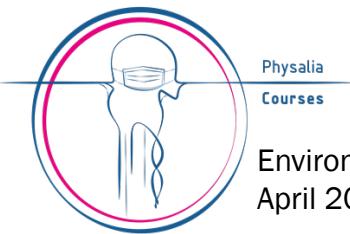
Organizer:

- Carlo Pecoraro, Physalia Courses
 - info@physalia-courses.org



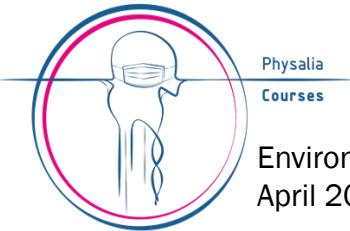
Instructors:

- Antti Karkman, University of Helsinki
 - antti.karkman@helsinki.fi
- Igor Pessi, University of Helsinki
 - igor.pessi@helsinki.fi



About you

- Name
- University/Institute/Company
- Research interest(s)
- Previous experience(s) with microbial ecology, metagenomics, bioinformatics, etc.
- General hopes for this course



Course outline

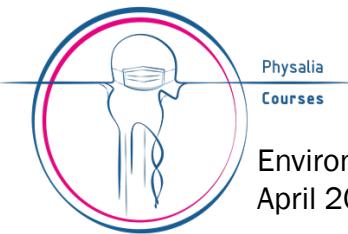
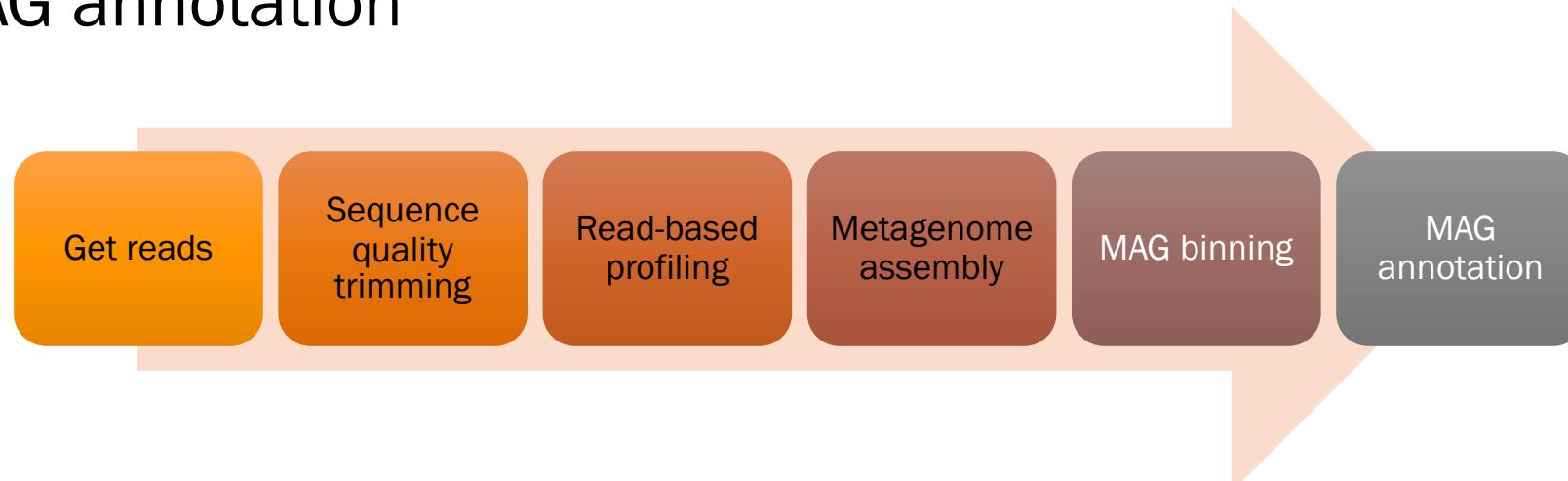
Day 1: Working with the command line and QC

Day 2: Read-based analyses

Day 3: Metagenome assembly

Day 4: MAG binning

Day 5: MAG annotation



Practical information: Zoom & GitHub

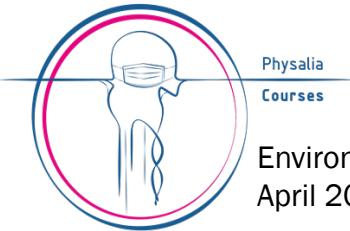
The course will take place in Zoom from 9 AM to 4 PM (CET)

- Link to the Zoom room in Slack ([#general](#))

The course page containing exercises and presentations is:

- https://github.com/karkman/Physalia_EnvMetagenomics_2022

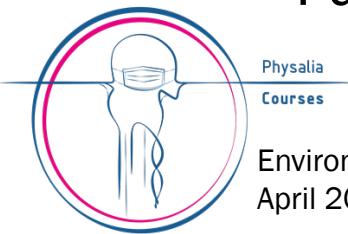
**Please bookmark this address!
(and remember to refresh the page often)**



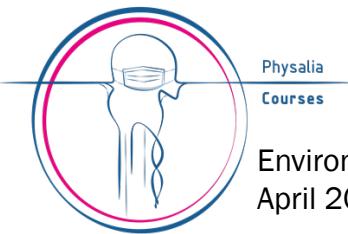
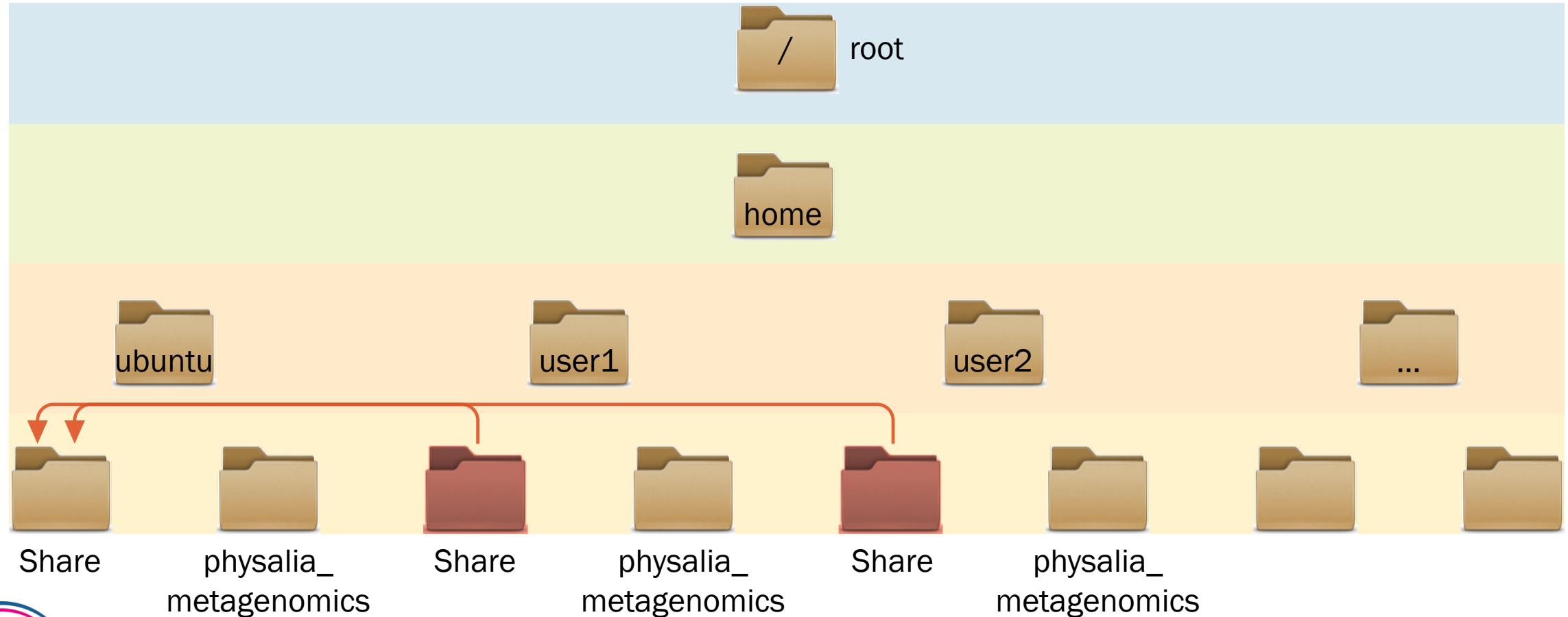
Practical information: Amazon Cloud (AWS EC2)



- See Slack ([#before-start](#)) for information on how to connect
 - Remember, the IP address will change every day
- Everyone has a user, a home and a shared folder
 - E.g. Alessia Levante is [user2](#)
 - Their key file is [c2.pem](#)
 - Their home folder is [/home/user2](#)
 - Their shared folder is [/home/user2/Share](#)
 - List of usernames can be found in Slack ([#before-start](#)).
- We will mostly use conda for managing the software environments
 - The environments are already set up for everyone
 - Further instructions on the GitHub page



Practical information: folders and files

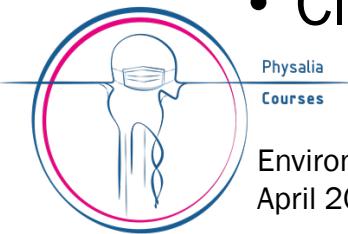


Practical information: FileZilla



Set-up instructions:

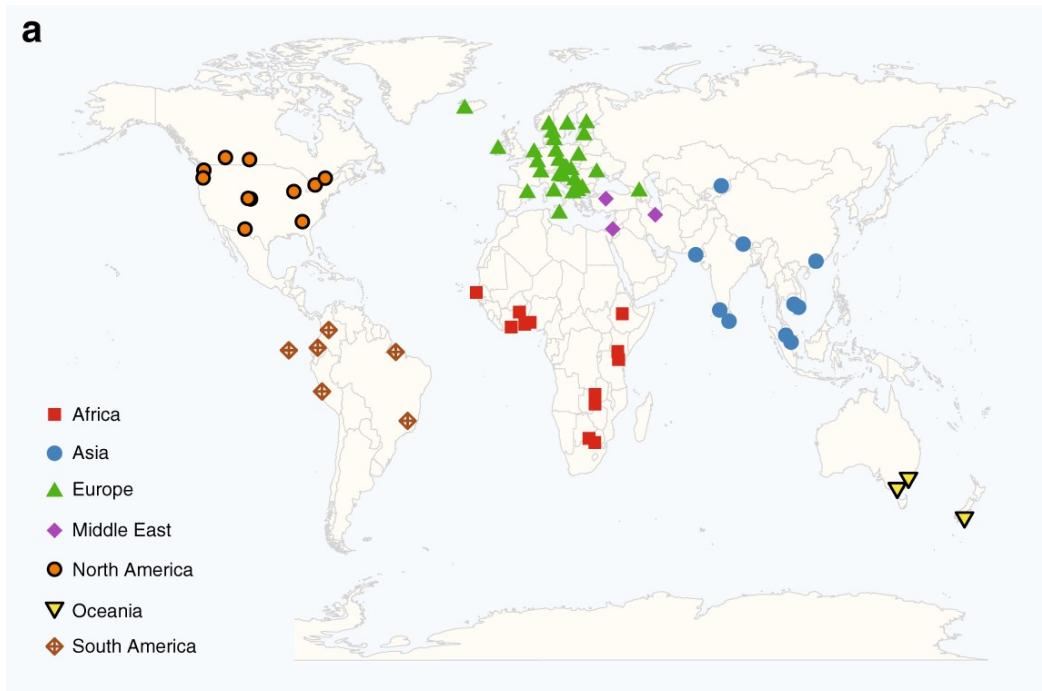
- Open FileZilla
- Click File > Site Manager
- Click New site
- Change Protocol to SFTP – SSH File Transfer Protocol
- In Host, type the IP address (has to be changed every day)
- In Port, type 22
- Change Logon type to Key file
- In User, type your username
- In Key file, select your pem file
- Click connect



Course data

Global Sewage Surveillance Project

- Raw sewage from > 60 countries



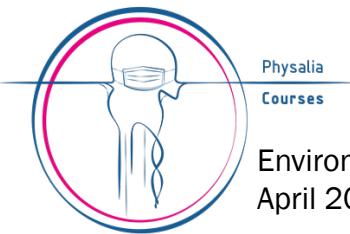
Article | [Open Access](#) | Published: 08 March 2019

Global monitoring of antimicrobial resistance based on metagenomics analyses of urban sewage

Rene S. Hendriksen, [Patrick Munk](#), ... [Frank M. Aarestrup](#) + Show authors

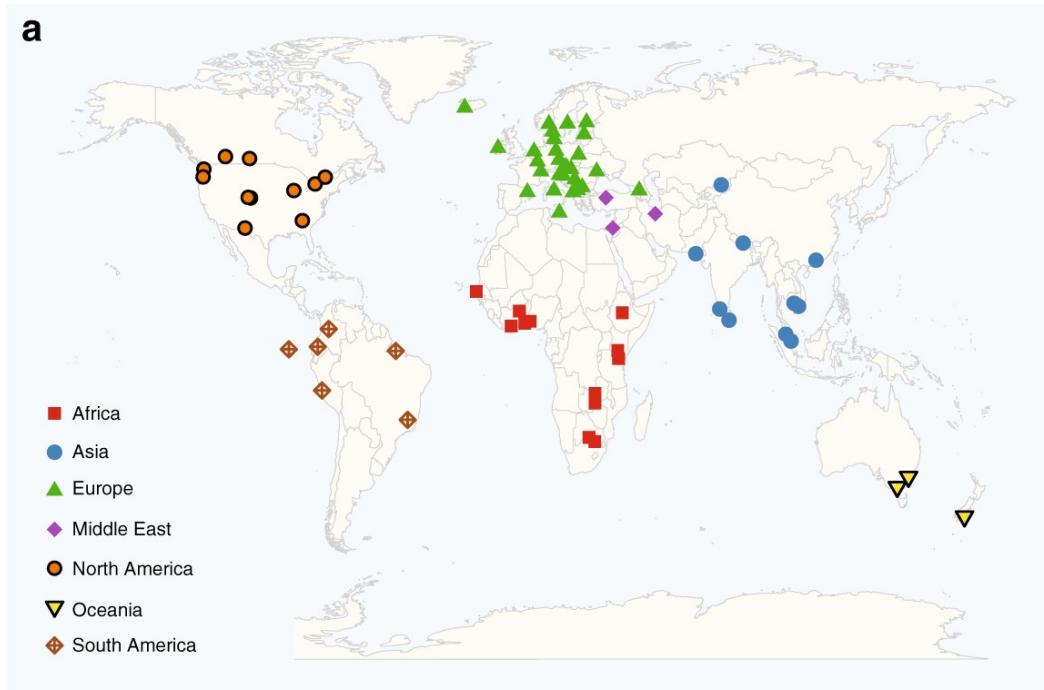
[Nature Communications](#) **10**, Article number: 1124 (2019) | [Cite this article](#)

52k Accesses | 247 Citations | 429 Altmetric | [Metrics](#)



Global Sewage Surveillance Project

- Raw sewage from > 60 countries



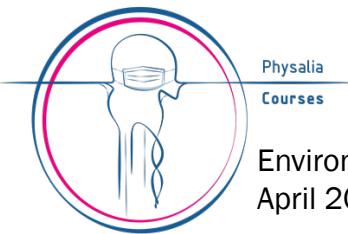
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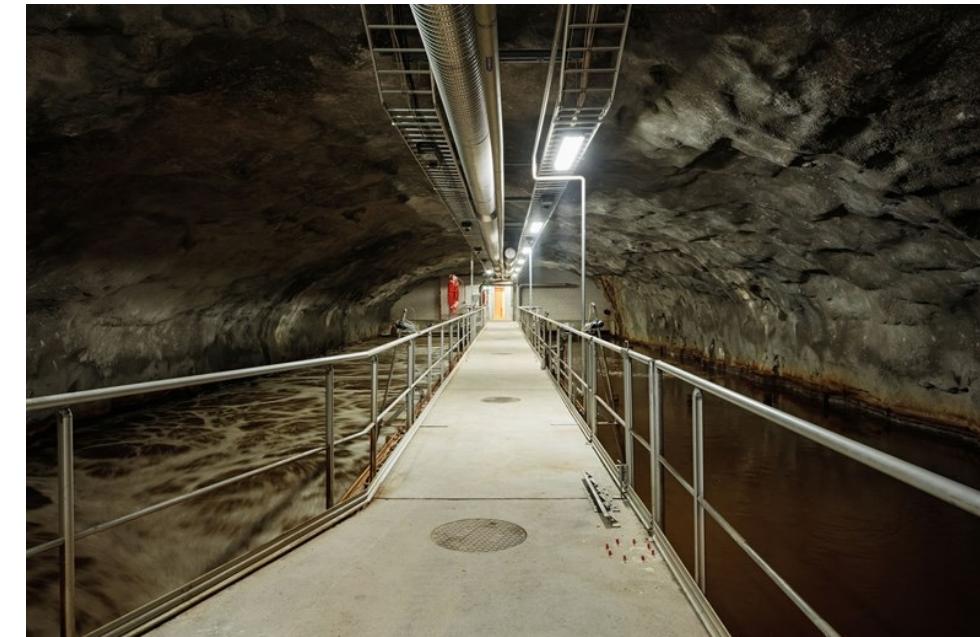
[Nature Communications](#) 10, Article number: 1124 (2019) | [Cite this article](#)

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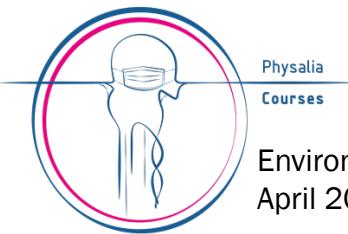


Viikinmäki waste water treatment plant

- Largest WWTP in the Nordic countries
- Serves 860 000 residents from the Helsinki region



HSY



Viikinmäki waste water treatment plant

- Largest WWTP in the Nordic countries
- Serves 860 000 residents from the Helsinki region
- Four samples with Illumina short-read data:

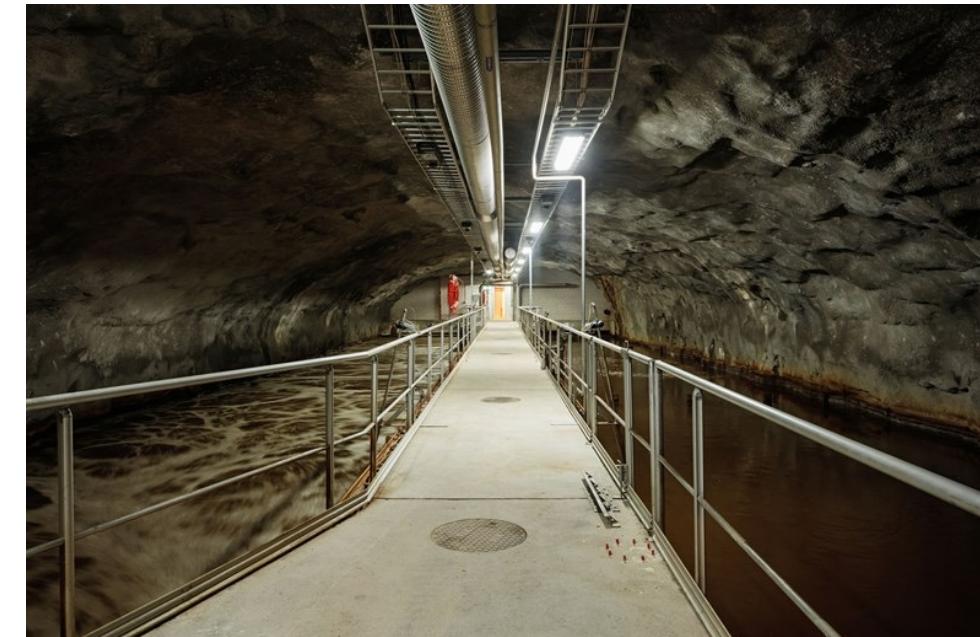
ERR1713356 winter 2016

ERR2592255 winter 2016

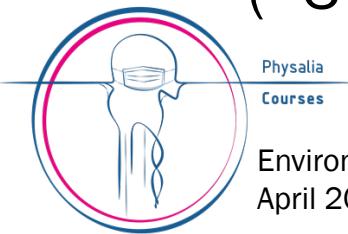
ERR2683233 summer 2017

ERR4682862 summer 2018

- Long-read data from 2019
(~3 Gbp PacBio HiFi)

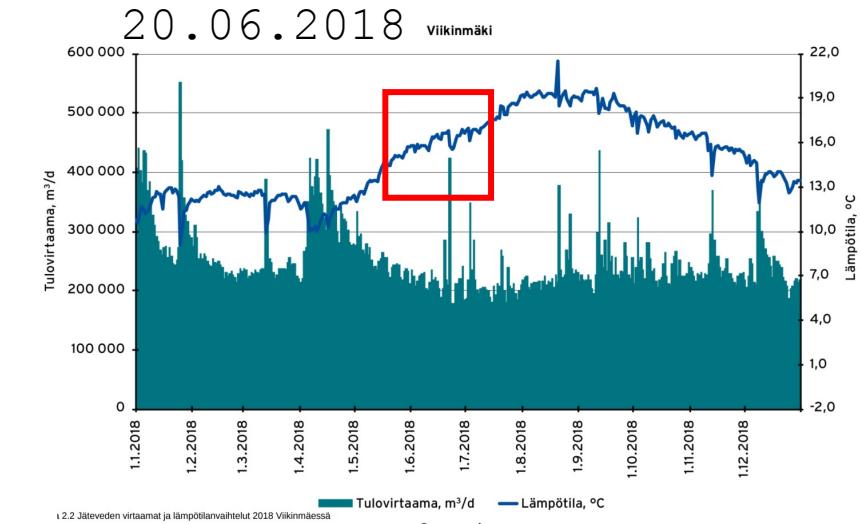
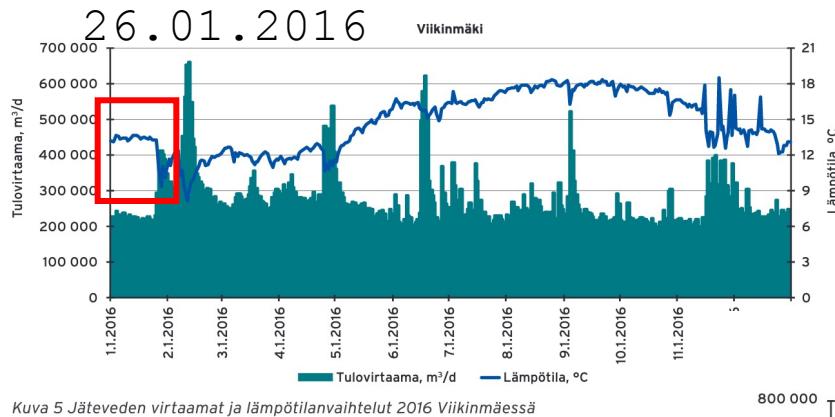


HSY



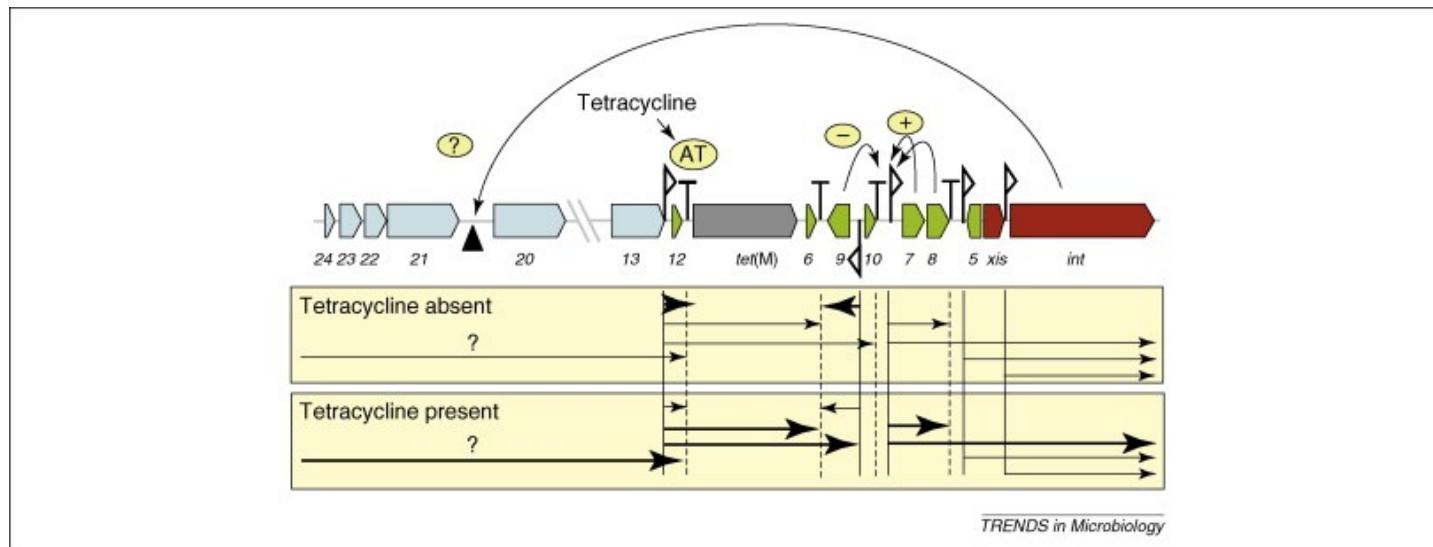
Research questions for the course

1. Is there a difference in the bacterial community composition between the seasons?



Research questions for the course

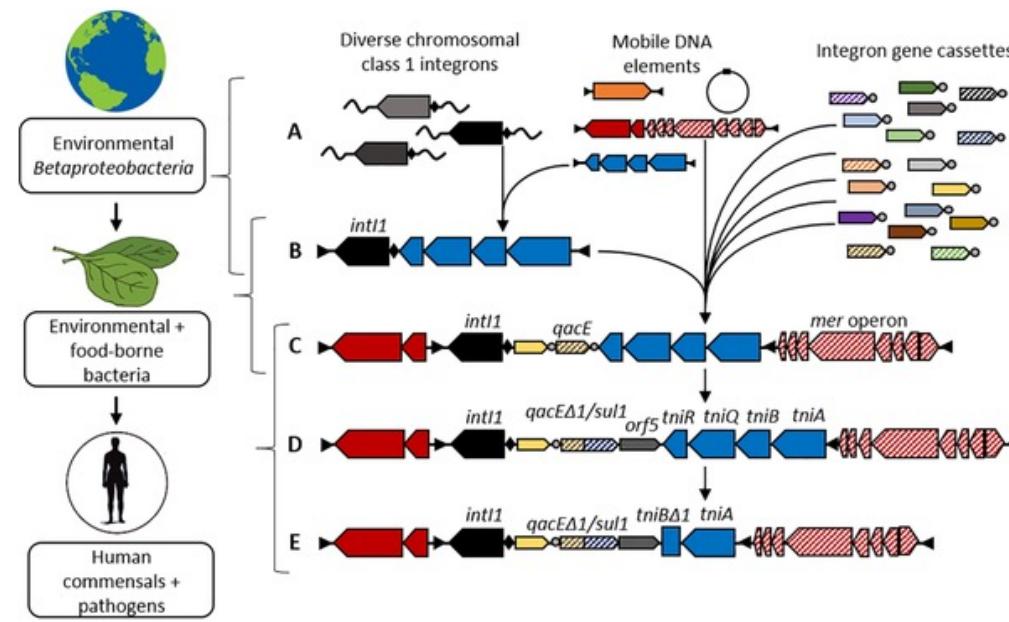
1. Is there a difference in the bacterial community composition between the seasons?
2. Do we find clinically relevant antibiotic resistance genes in multiple context?



Trends in Microbiology 2009 17:251-258 DOI: (10.1016/j.tim.2009.03.002)

Research questions for the course

1. Is there a difference in the bacterial community composition between the seasons?
2. Do we find clinically relevant antibiotic resistance genes in multiple context?
3. Which bacteria carry class 1 integrons?



Igor S. Pessi & Antti Karkman, University of Helsinki

Ghaly TM, Chow L, Asher AJ, Waldron LS, Gillings MR (2017) Evolution of class 1 integrons: Mobilization and dispersal via food-borne bacteria. PLOS ONE 12(6): e0179169.
<https://doi.org/10.1371/journal.pone.0179169>