

BINF2111 - Introduction to Bioinformatics

Computing

Course Introduction



Richard Allen White III, PhD
RAW Lab

Lecture 1 - Tuesday Aug 23rd, 2022

Learning Objectives

- Introduction Dr. White III and his RAW lab research
- Go through the Syllabus on Canvas
- Calendar and Schedule
- Computer set-up
- Introduce github page

Introduction general

- Dr. Richard Allen White III & Jose Figueroa

Tell us a little about yourself?

- Name
- Major
- Why this course?
- Main career goal (currently)
- Favorite food

What is bioinformatics?

Bioinformatics is an interdisciplinary field which harnesses computer science, mathematics, physics, and biology that **harnesses computation to understand biology**.

Computational biology = Bioinformatics

Introduction - Term Experiment

- What are the key words when you think of bioinfomatics?
- Pick three words you know or have heard of.
- Link
<https://docs.google.com/forms/d/10qCDySV757IfY51m1PUVpF8674stclJQ3nNrHi3APbM/edit>
- Word cloud for next class

Introduction – How many?

- How many people do you know in the class?
- Select one option (0, 1, 2, 3, >3)
- Link
<https://docs.google.com/forms/d/1SK598CbJtZZMsnZ6KKMqZT8jANZ9y1O8FEhSFNcHRPU/edit>
- Results next class

Introduction – What year?

- What year are you at UNCC?
- Select a single term
- Link
<https://docs.google.com/forms/d/14IqA5lYwiM7EDjPQNwn7pFgBeUgiG8-oszfqsFAs0MU/edit>
- Results next class

Introduction – What worries?

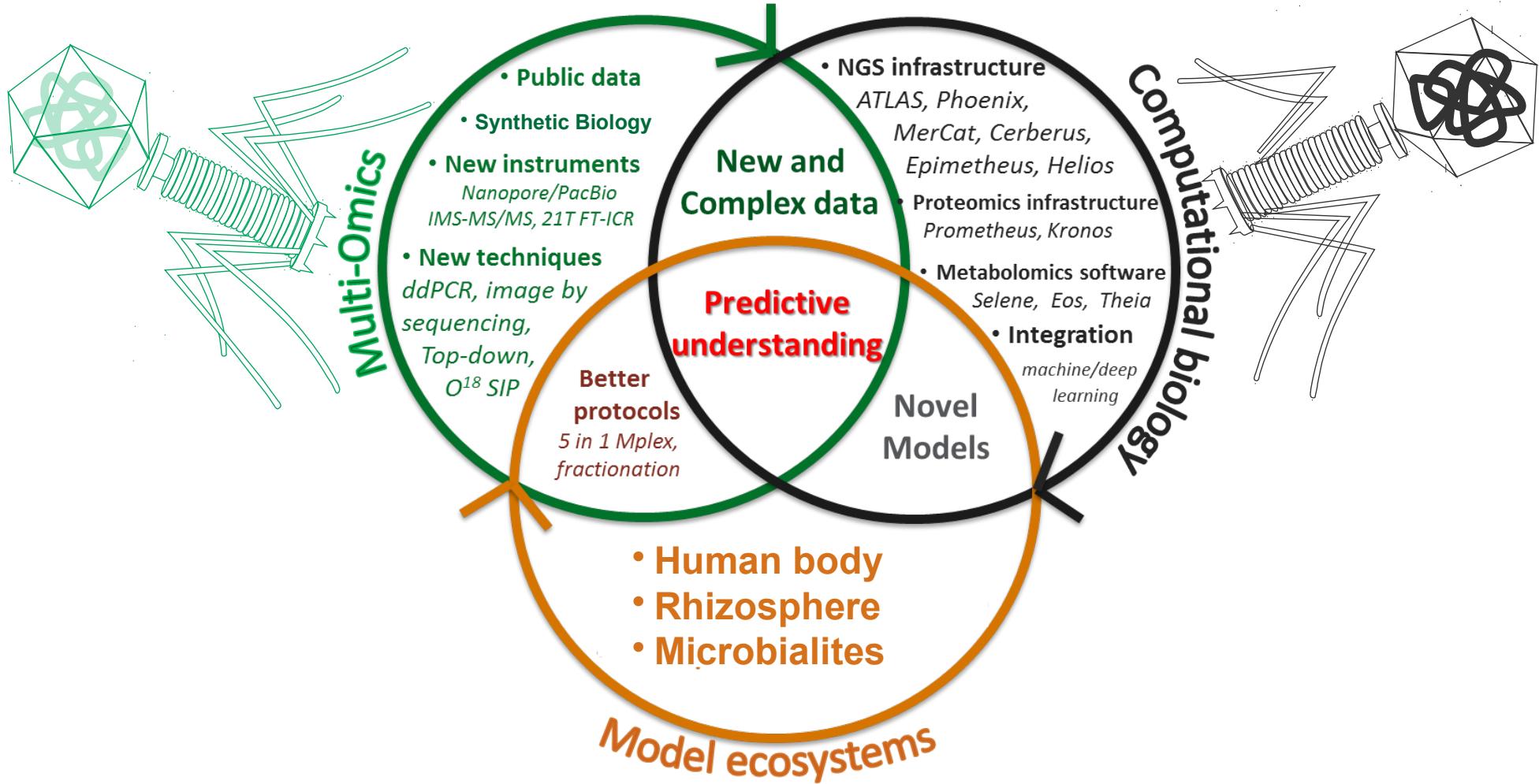
- What makes you worry the most about the course?
- Type a single term
- Link
<https://docs.google.com/forms/d/1oVw-01LuG9JSQaAkS17cRdvsCD1XkkXJih29YBrrbfg/edit>
- Results next class

RAW LAB

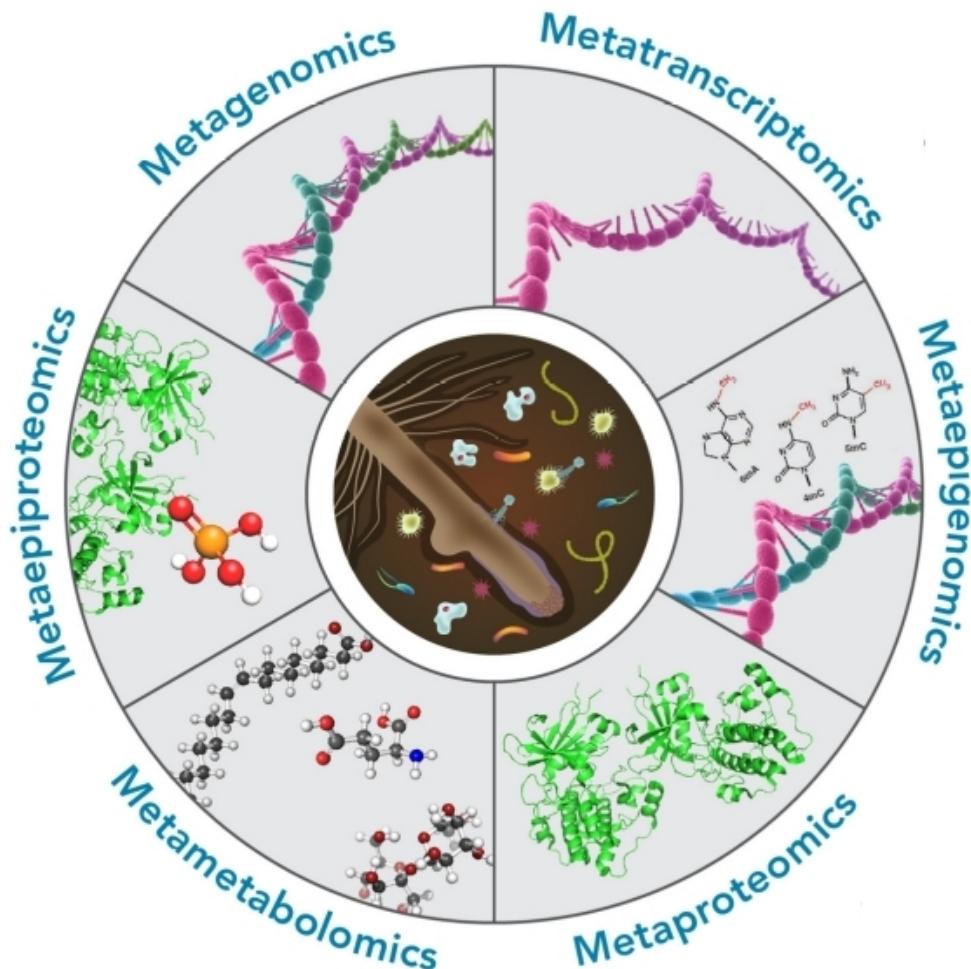
Understanding the totality of the virome - from farm to gut

- Viral lifestyle influencing microbial-host interactions
 - Phages as therapies for human viruses
 - Phage therapy for antibiotic resistant microbes
- > Check us at www.rawlab.org

RAW LAB - Group Model

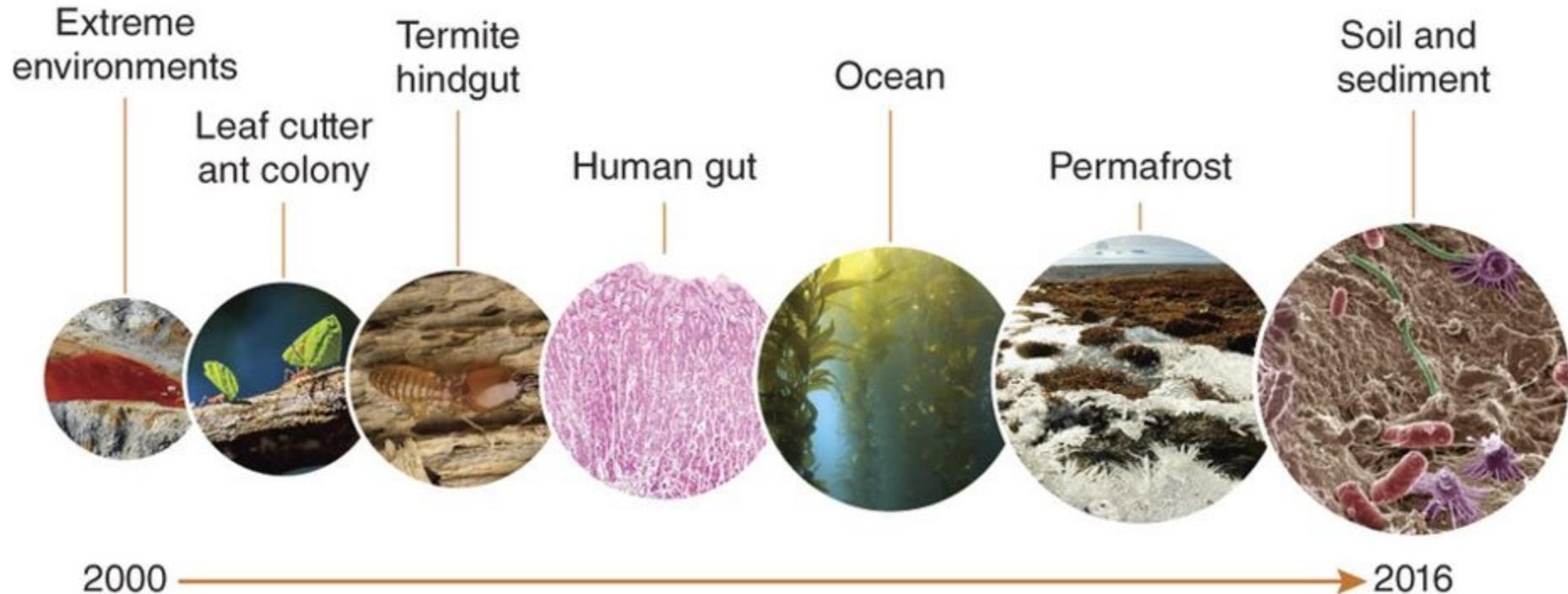


RAW LAB – Omics terms (Wheel O' omics)

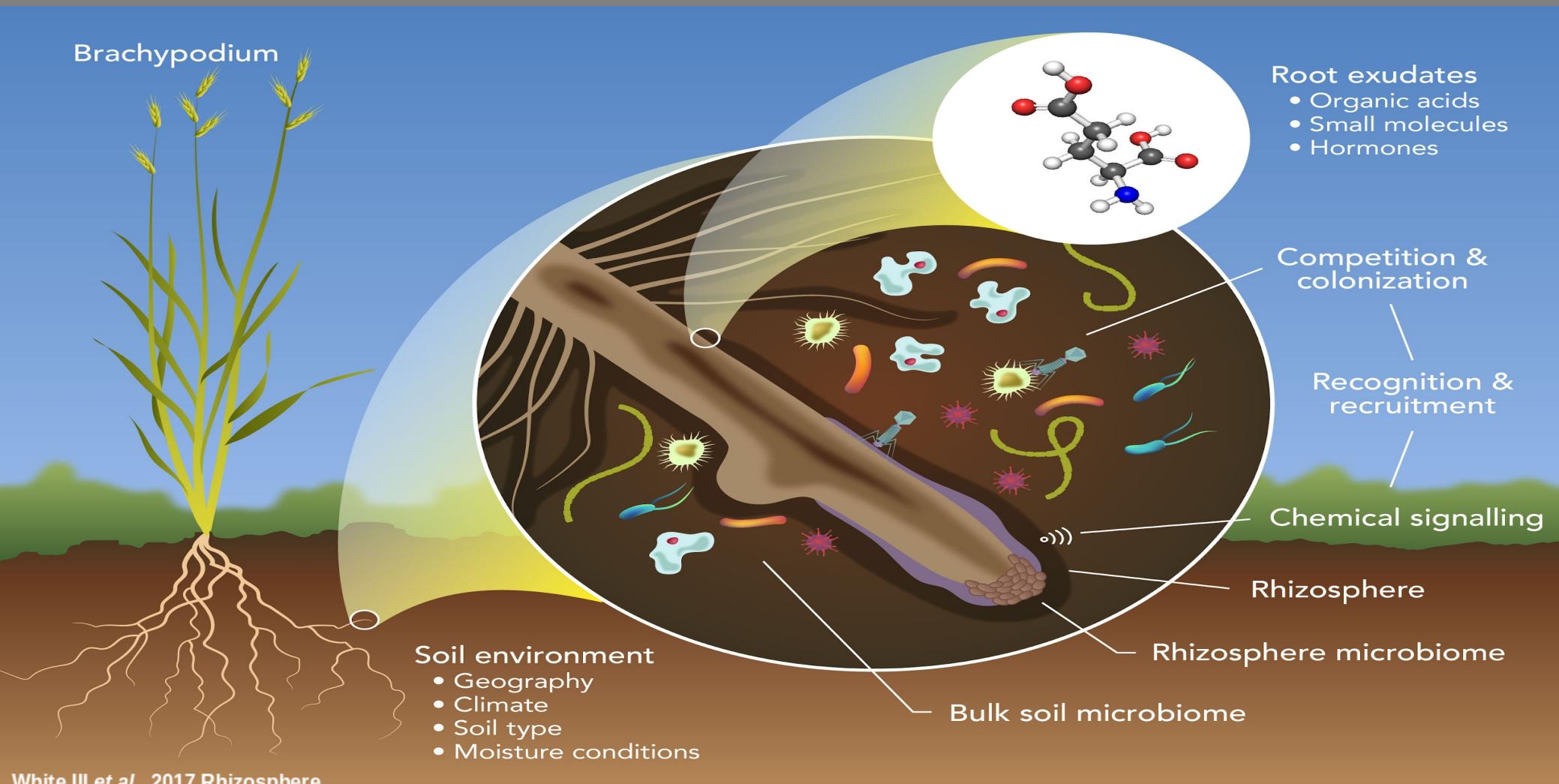


RAW LAB - microbiomes

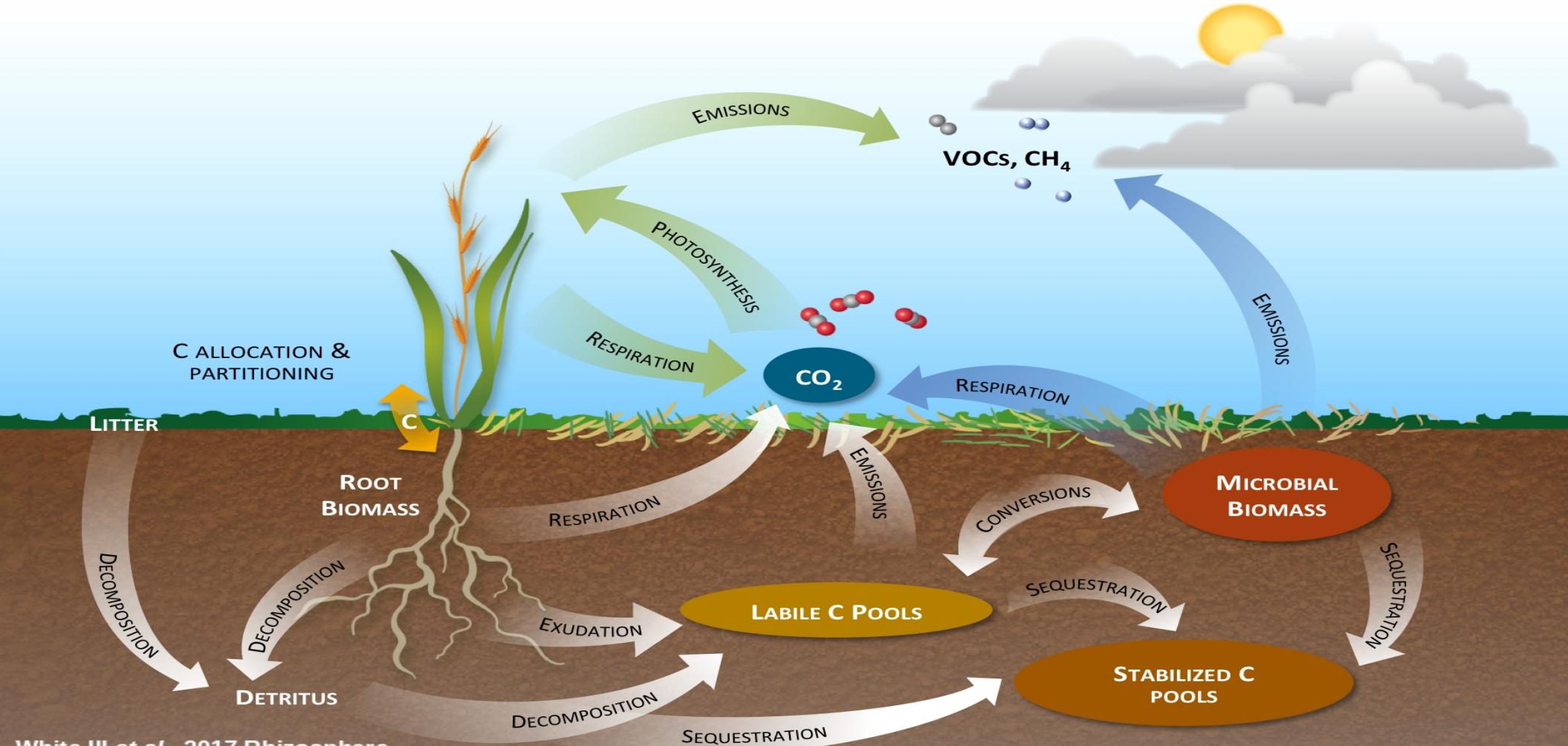
Microbiome complexity and multi-omics analysis timeline



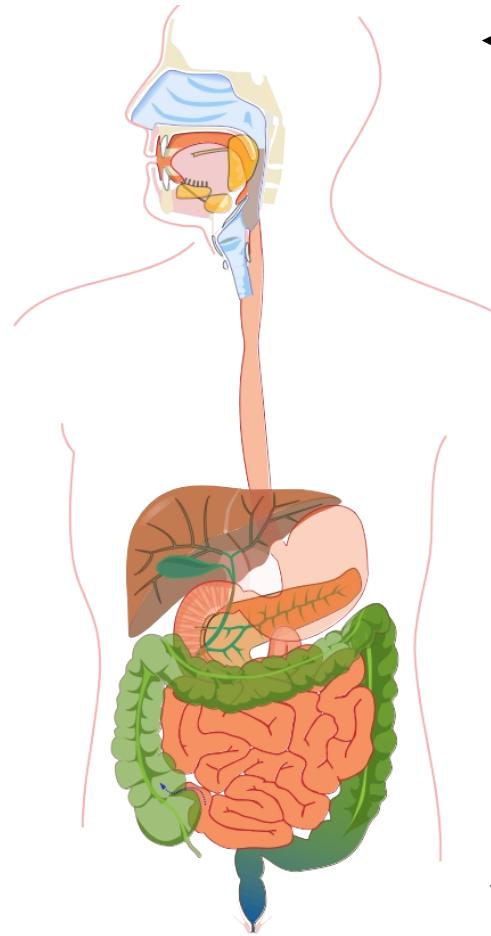
RAW LAB - Rhizosphere impacting carbon cycling



RAW LAB - Rhizosphere impacting carbon cycling



RAW LAB - Human microbiome and virome



100 Trillion

150:1 genes

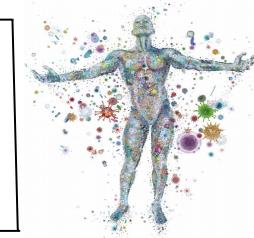
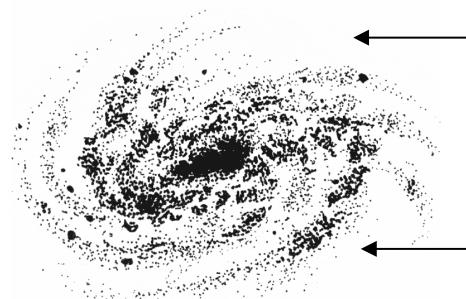
5:1 viruses

1.3x cells

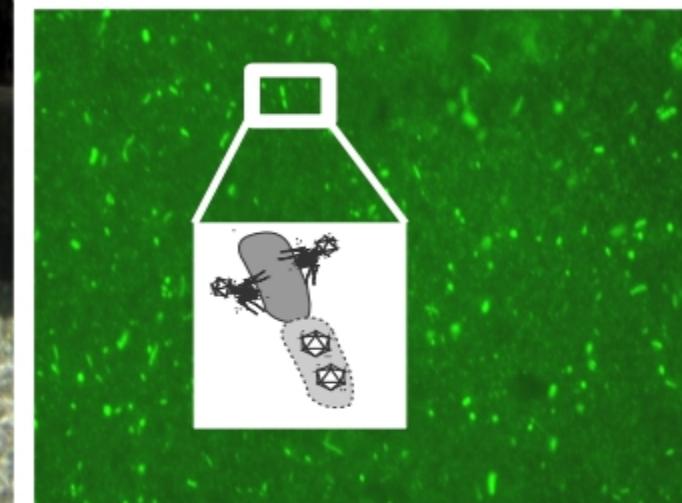
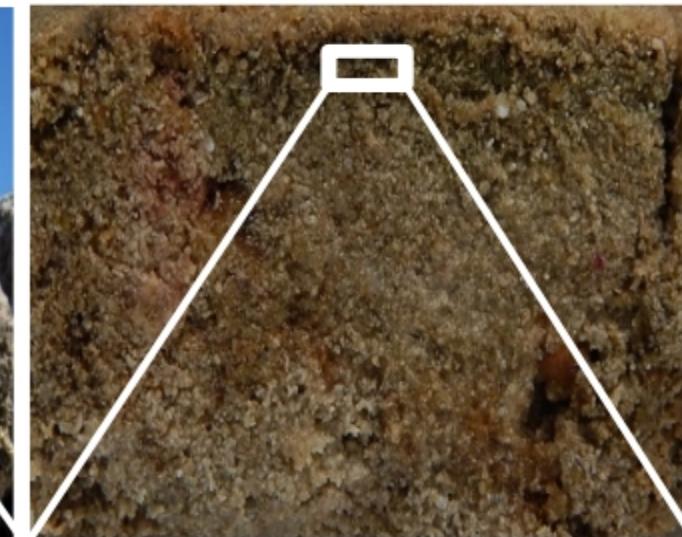


2.5x

12.5x



RAW LAB - Modern microbialites/stromatolites



Syllabus – essential course details

- Meeting time T/TH 11:30-12:45, TH lab 2:30-5:15 pm EST
- Office hours TH 5:15-6:15 pm or by appointment.
- Canvas
- No Slack
- Course github page (<https://github.com/raw-lab/BINF2111>)
- Bioinformatics building 217

Syllabus – essential course details II

- Computer required (Linux or MacOX preferred, Windows possible)
- Taken BINF1101/1101L (let me know if you haven't)
- Textbooks: None required for this course
- Zero credit lab must be taken concurrently with the course
- One grade for both BINF 2111 and 2111L

Syllabus: Objectives of the course

- Use and understand UNIX command line environment
- Use built-in UNIX commands to manipulate files and data
- Text and file manipulation (sed, grep, bioawk, python)
- Basic knowledge and use of github
- Use bash shell scripts to drive pipelines of bioinformatics programs
- Use of supercomputer for running bash shell scripts (basic slurm)
- Use python scripts to read, manipulate and write bioinformatics datafiles

Syllabus: Grading

Grading rubric

- Lab assignments: 30% (12 Lab assignments, 2.5% each, late assignments will NOT be graded)
- Daily Quizzes: 40% (two lowest scores will be dropped)
- Mid-term Exam: 10% (5% lecture/lab)
- Final Exam: 10% (5% lecture/lab)

Based on points for grading

100-90% = A

89-80% = B

79-70% = C

69-60% = D

<59% = F or U

Any grade in-between will be rounded to the next highest grade.

While grades are important, and you should strive to get the highest marks.

The knowledge you take with you and gain will last a lifetime!!

Syllabus: Sections Diversity, Mental health, Title IX

- Please read: An environment of non-discrimination and diversity section
- Please read: Mental healthcare and positive self-care
- Please read: Title XI reporting of sexual harassment or other related reporting
- Please read: Disability accommodations

ANY Questions?

Syllabus: Course Schedule

COURSE CALENDAR (Tentative Plan)

Week 1 (Aug 23 rd)	Introduction to UNIX and command line
Week 2 (Aug 30 th)	UNIX commands (cut, grep, etc)
Week 3 (Sep 6 th)	Github introduction and markdown
Week 4 (Sep 13 th)	Sed/grep/bioawk file manipulation, Regular expressions
Week 5 (Sep 20 th)	Bash shell scripting basics
Week 6 (Sep 27 th)	Bash shell/slurm - SuperCPU operations
Week 7 (Oct 4 th)	Basic Python Commands (Part I)
Week 8 (Oct 11 th)	No Classes - Student Recess
Week 9 (Oct 18 th)	Mid-term Exam
Week 10 (Oct 25 th)	Basic Python Commands (Part II)
Week 11 (Nov 1 st)	Python loops, lists, and basic file methods
Week 12 (Nov 8 th)	Python functions, dictionaries, regular expressions
Week 13 (Nov 15 th)	Python introduction Pandas and Seaborn
Week 14 (Nov 22 nd)	No Classes - Thanksgiving
Week 15 (Nov 29 th)	Review of course
Week 16 (Dec 8 th)	Final exam

Github page

- <https://github.com/raw-lab/BINF2111>

Windows tutorial to install linux

- On canvas
- On our github in course materials

<https://github.com/raw-lab/BINF2111/blob/main/course-materials/Windows-Install-linux.pdf>

Quiz 1

- On canvas now