

Workshop: Computational analysis strategies for the discovery of new biomolecules from microorganism genomes.

Date: 6-10 November, 2017.

Place: Organization for Tropical Studies, Ciudad de la Investigación, University of Costa Rica.

Capacity: 16-22 participants.

Organizer: Dr. Adrián Pinto-Tomás, Center for Research in Microscopic Structures, University of Costa Rica

Description: This workshop will discuss the latest tools for processing and analyzing nucleic acid sequences generated by state-of-the-art technologies. In addition, the technical fundamentals of the tools, as well as the biological meaning and interpretation of their results will be covered. Guided by instructors, participants will develop their own projects using the knowledge gained in the workshop.

Instructors:

Dr. Sean M. Gibbons: Postdoctoral researcher at the Massachusetts Institute of Technology (MIT), Biological engineering. Dr. Gibbons investigates how simple interactions can trigger the emergence of very sophisticated behaviors in the human microbiome. It applies quantitative tools to study the ecology and evolution of microbial systems and studies how changes in microbial frequencies covariate within a fluctuating environment, and how they are related to phylogenetic distance or natural history strategies.

Dr. Gabriel Vargas Asensio: PhD researcher at the University of Chicago, Department of Geophysical Sciences. In his research, Dr. Vargas studies the ecology and evolution of microbial communities in aquatic systems and the impact of their interactions on the planet's biogeochemical cycles. His research intends to understand the metabolism and the genetic regulation of photo-heterotrophic bacteria and their bacteriophages, using state of the art tools in genetics, molecular biology and bioinformatics.

The workshop had 20 participants; students and researchers from the University of Costa Rica (UCR), the Costa Rican Institute of Technology (ITCR), the National Center for Biotechnology Innovations (CENIBiot), the National Center for Advanced Computing (CNCA) and the Organization for Tropical Studies (OTS), mainly interested in areas such as environmental microbiology, bioinformatics, molecular biology and biotechnology. We had students from different academic levels: undergraduate (10%), master's degree (60%), doctoral degree (10%) and professors/researchers (20%), which reflect the interest of both the student and professional communities for this type of workshops.

The proposed program of activities was satisfactorily fulfilled (Figure 1). The participants were able to learn according to their level of knowledge in the subject, supported with the information provided and the constant help of the instructors. The attendees are very motivated, with great challenges to reach in the near future, understanding that they have a local support group. We are positive that the bioinformatics area is going to develop even further in Costa Rica; as long as the existing computational capacities are improved at the national level.



Figure 1. **Workshop activities:** A. Introduction to the International Society for Microbial Ecology-ISME by Dr. Adrián Pinto Tomás, Ph D. B. Lecture about transcriptomics by Dr. Gabriel Vargas Asensio.

The workshop was covered by the Outreach Office at the University of Costa Rica. They produce a piece in Spanish titled “Microbes are no longer our enemies” <https://www.ucr.ac.cr/noticias/2017/11/21/los-microbios-dejan-de-ser-enemigos.html>. We consider the event a great success and we look forward towards working closely with ISME in similar activities.



Figure 2. Workshop at the University of Costa Rica. Left to right, back to front: Bernal Matarrita, Ibrahim Zuñiga, Daniela Vidaurre, Silver Ceballos, Lorena Uribe, Luis Porras, Carlos Gamboa, María Luisa Gómez, Brad Mendoza, Allan Artavia, Laura Brenes, Isayana Sandoval, Luz Chacón, Catalina Murillo, Esteve Mesén, Vanessa Mora, Lisbeth Ramirez, Adrián Pinto, Sean Gibbons, Gabriel Vargas, Jessica Morera and Carlos Gamboa.

Workshop invitation



UNIVERSIDAD DE
COSTA RICA **CIEMIC** Centro de Investigación en
Estructuras Microscópicas

Invitan al:

Taller de estrategias de análisis computacionales para el descubrimiento de nuevas biomoléculas a partir de genomas de microorganismos

Descripción:

En este taller se enseñarán las últimas herramientas de procesamiento y análisis de secuencias generadas por tecnologías de última generación. Además, se discutirán los fundamentos técnicos de las herramientas, así como el significado biológico y la interpretación de sus resultados. Guiados por los instructores, los participantes desarrollarán sus propios proyectos utilizando los conocimientos obtenidos en el taller.

INSTRUCTORES:

Dr. Sean M. Gibbons: Investigador posdoctoral del Instituto Tecnológico de Massachusetts (MIT), Ingeniería biológica.

Dr. Gabriel Vargas Asensio: Investigador doctoral de la Universidad de Chicago, Departamento de Ciencias Geofísicas.

Del 6 al 10 de noviembre

Aula, Organización para
Estudios Tropicales, Ciudad
de la Investigación, UCR.

Cupo: 16 estudiantes.

Organiza:



Colaboran:



UCR

Program

Hour	Monday 6	Tuesday 7	Wednesday 8	Thursday 9	Friday 10
9:00 -10:20	-Welcome and Introduction to workshop (AP). -Talk: Perspectives in microbial ecology and human microbiome (SG).	-ORFs prediction (GV). -Functional annotation (GV).	-ANVIO. Comparative Genomics (GV).	-Transcriptomics III (SG). - Brainstorming for project development.	- Project development IV.
10:20-10:40	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
10:40 - 12:00	-Introduction to the International Society for Microbial Ecology- ISME. (AP). -Introduction to the "Colaboratorio Nacional de Computación Avanzada" (CNCA) and establishment of remote connections to its server	-ANVIO. Genome mapping (GV)	--ANVIO. Comparative Genomics (GV).	- Project development I.	- Project presentation I.
12:00 -13:00	Lunch	Lunch	Lunch	Lunch	Lunch
13:00 - 14:20	- Quality control of sequences from Illumina (SG). -Genome assembly (GV).	-ANVIO. Metagenome binning (GV).	-Transcriptomics I (SG).	- Project development II.	- Project presentation II.
14:20 - 14:40	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
15:00 - 16:30	-Metagenome assembly (GV).	-ANVIO. MAGs reconstruction (GV).	-Transcriptomics II (SG).	- Project development III.	-Round Table (AP) -Closing activity.

Dr. Adrián Pinto Tomás (AP); Dr. Gabriel Vargas Asensio (GV), Dr. Sean Gibbons (SG).