Contribution ID : **58** Type : **not specified**

Experiments and working in groups

Thursday, 7 November 2024 09:00 (7:30)

Content

Group Work 1 **Acoustic monitoring** Animals use sounds in different behavioral context, including communication, echolocation, sexual display and territoriality. Over the last decade, the use of the natural sounds has emerged as an increasingly important and widely-used tool for studying wildlife and habitats. Among the current uses of acoustic monitoring are the study of species and populations, animal behavior, the acoustic communities and biodiversity. Based on acoustic records obtained in nature, we will attempt to examine how the frequency spectrum varies throughout 24 hours of recording, taking into account the different zoological groups involved in an acoustic community in Western Cuba. In addition, we are going to examine the dynamics of a chorus of a Cuban endemic frog, analyzing how their spectral and temporal patterns are distributed during the peak of nocturnal activity of the species. To complete this task, students will receive a theoretical part on bioacoustics and ecoacoustics topics, while the practical component includes from obtaining recordings in the field to the processing and analysis of sounds using specialized software and programming exercises. *Roberto ALONSO (University of Havana, Cuba) Luís Felipe TOLEDO (UNICAMP, Brazil)*

Group Work 2 **Quantifying air-travelling biofluids** We will visualise and quantify the motion of model medical fluids resembling nasal sprays, as they move through free space and inside a 3D-printed model of a human nasal cavity. The idea is to quantify how different administration methods are able to reach target regions within the nasal cavity. In addition to experiments, computer simulations will help understand the process and study experimental configurations unavailable in practice. *Daniela MARTINEZ-ORTIZ, Lazaro MARTINEZ-ORTIZ, Ernesto ALTSHULER (University of Havana, Cuba)*

Group Work 3 **Quantifying microbial ecosystems I** Generally speaking, this experiment will measure the formation and dynamics of redox gradients in natural microbial ecosystems as they relax to steady state. This group will focus on the measurements of the diverse timescales over which microbial metabolism at depth is coupled to temporal variations at the surface, for example the day night cycle. This group will build a device to continuously record these dynamics, using harmless microbial species. *Alex PETROFF(Clark University, USA)*

Group Work 4 **Quantifying microbial ecosystems II** Generally speaking, this experiment will measure the formation and dynamics of redox gradients in natural microbial ecosystems as they relax to steady state. This group will focus on the motion of the constituent microbes. The participants will use microscopy to visualize the motion microbes as they form fronts that stabilize redox gradients. This group will additionally seek to enrich bacteria that are capable of navigating these gradients. *Alex PETROFF(Clark University, USA)*

Group Work 5 **Ecology and coexistence in a chemostat** In this experiment, the students will grow two E. coli strains with obligate mutualistic interactions in a chemostat. The coexistence of the two strains will be manipulated by changing experimental conditions (dilution rate and medium composition). *José PEREIRO MOREJÓN, Gabriele MICALI (Humanitas Research Hospital, Italy) William SHOEMAKER (ICTP, Italy)*

Group Work 6 **Luria-Delbruck experiment** This module will engage students with measuring mutation rates in expanding yeast populations. This is the classic "Luria-Delbruck" experiment which is also a pioneering historical example of interdisciplinary collaboration in quantitative biology. We will introduce the mathematical framework and population dynamics models needed to approach the problem, along with relevant results from the literature. Students will have the opportunity to perform the experiment themselves using yeast, measuring the rate of emergence of resistance mutations and testing scenarios of induced versus spontaneous phenotypic transitions. This will involve growing cells in multi-well plates, applying a stress such as phages or drugs, and quantifying the fraction and abundance of surviving colonies. By using stochastic models and model-selection strategies, students will be asked to answer key questions and compare different resistance targets. Overall, this module provides students with a hands-on understanding of mutation rates and population dynamics. *Giorgio TALLARICO (IFOM, Italy) Marco COSENTINO LAGOMARSINO (IFOM, Italy)*

Summary

Session Classification : notitle