

Population Dynamics Virtual Seminar



Leonardo Pacciani-Mori
University of Padua

16.04.21 - 5:00 pm GMT

Species coexistence and proteome allocation in competitive microbial communities

Microbial communities are ubiquitous and play crucial roles in many natural processes. Despite their importance for the environment, industry and human health, however, there are still many aspects of microbial communities that we do not fully understand. It is a long-standing problem, for example, the fact that microbial communities are normally much more diverse than what models would allow. Recent experiments, then, have shown that the metabolism of microbial species in a community is intertwined with its structure, suggesting that properties at the intracellular level such as the allocation of cellular proteomic resources must be taken into account when describing microbial communities and species abundances.

In this talk I will illustrate the problem of describing biodiversity in purely competitive microbial communities, and how models fail to predict the right number of coexisting species. Then, I will show how we can reconsider one of the most commonly used models to describe population dynamics in competitive ecosystems in light of known experimental results that link the species' growth rate to the allocation of their proteome. This new framework describes microbial communities at an "intermediate" level of complexity, describing the species' population dynamics while also retaining insights on the molecular aspects of growth. The results of the model are also compared to some experimental data.

Suggested Reading: Pacciani-Mori, L., Suweis, S., Maritan, A. et al. Constrained proteome allocation affects coexistence in models of competitive microbial communities. *ISME J* (2021). <https://doi.org/10.1038/s41396-020-00863-0>