Outlook

Contact 9th Meeting of the Swiss Microbial Ecology from maxime.batsch@unil.ch

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Type of presentation:
Oral presentation

Title:
Understanding how local multi-species interactions drive larger-scale bacterial community dynamics in fragmented habitats

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Abstract (300 words maximum): :
The formation of diverse microbial communities is thought to be driven by complex networks of interspecific interactions, which themselves may be highly dependent on spatial structures in the communities' natural habitats. For example, spatially fragmented habitats result in a collection of local isolated smaller communities with varying richness and interactions, that aggregate to the emergent (meta-)community development and properties at a larger scale. The importance of varying scales and richness under habitat fragmentation for community development is still poorly understood, due to methodological challenges of investigating interspecific interactions within spatially fragmented communities. Here, we studied the differences in development of a synthetic soil community of 21 bacterial species under fragmented or continuous habitats. For fragmentation, we used emulsions of droplets of variable volume (pL-range) with randomly encapsulated cells at densities ranging from 1 (pure cultures), to 3-7 and 12-17 species per droplet. Irrespective of substrate conditions (single or mixture), communities in continuous habitats developed the lowest productivity and diversity evenness, with clear overgrowth by a few fast-growing opportunistic strains. The same starting community under fragmented growth conditions kept statistically significantly higher evenness and showed higher overall productivity, with more apparent opportunistic outgrowth at the higher per-droplet than at low species starting order. Evenness was highest with single species growing in isolated droplets, but aggregate productivity was lower. Several strains developed less well in small starter communities than in isolation, and

others doing better, suggesting competitive metabolic interactions. Overall, our observations indicate the strong impact of habitat structures on community composition and suggest a negative effect of higher-order interactions on species co-existence in larger-scale fragmented habitats.
