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Microbial community assembly in an evolving ecosystem

Ecological succession and functional properties of soil microbes

Francisco Dini-Andreote

1. Microbes play essential roles in soil biogeochemistry and their multifaceted traits have an intricate influence on ecological succession at a landscape level. *(This thesis)*
2. Temporal niche partitioning in microbial populations represents a plausible mechanism by which community turnover promotes biodiversity in highly-dynamic environmental conditions. *(Chapter 2)*
3. Microbial community succession is mediated by an interplay of stochastic and deterministic processes. The mechanisms mediating their relative influences are scale-dependent. *(Chapter 3)*
4. Integrating predicted fungal ecophysologies into an ecological succession framework is critical for ascertaining the processes mediating (fungal-driven) carbon dynamics in soils. *(Chapter 4)*
5. Addition of the microbial '*flight or fight*' modus to the microbial community assembly framework will aid our understanding of the 'colonization' of land by microbes. *(Chapter 5)*
6. A sound understanding of the mechanisms that govern the composition of microbially-mediated nitrogen cycle genes through succession is fundamental to the development of models that describe ecosystem formation. *(Chapter 6)*
7. Microbial community assembly and turnover are governed by a myriad of mechanisms. The challenge lies in integrating these into a conceptual framework, in order to make the complexity of microbial communities comprehensible. *(This thesis)*
8. "Microbial life can easily live without us; we, however, cannot survive without the global catalysis and environmental transformations microbial life provides." *(P.G. Falkowski et al. 2008, The microbial engines that drive Earth's biogeochemical cycles, Science 320: 1034-1038)*
9. "As a scientist, you are a professional writer: your career is built on successful proposals and papers. Yet success isn't defined by getting papers into print, but by getting them into the reader's consciousness." *(J. Schimel 2012, from the book "Writing Science: how to write papers that get cited and proposals that get funded")*
10. "Some scientists find, or so it seems, that they get their best ideas when smoking; others by drinking coffee or whisky. Thus there is no reason why I should not admit that some may get their ideas by observing, or by repeating observations." *(K.R. Popper 1983 from the book Realism and the aim of science)*
11. There are no such things as data without noise. In biology, we call that life. *(Modified from J.C. Venter 2004, from the book "The Genome War" by J. Shreeve)*