

Ultra-rare microorganisms quickly transform deep-sea wood falls into chemosynthesis based ecosystems

Dimitri Kalenitchenko¹, Erwan Peru², Nadine Le Bris², Pierre E. Galand²

¹Laval University; dimitri.kalenitchenko@gmail.com

²Sorbonne Universités, UPMC Université Paris 06, CNRS, Laboratoire d'Ecogeochimie des Environnements Benthiques (LECOB), Observatoire Oceanologique, Banyuls sur Mer, France

Wood falls are found on the deep-seafloor, especially in areas experiencing extreme meteorological events, but naturel wood falls remains rare in exploration reports. The scarce wood debris discovered by chance were colonized by specialized r-selected fauna, which is consistent with the fact that wood falls are ephemeral habitats. In this highly dynamic system we have demonstrated the crucial role played by free-living microorganisms that establish the chemical conditions required for wood-fall chemosynthetic communities to establish.

Surprisingly these essential microorganisms were part of the seawater ultra-rare microbial seed bank, which is not detectable by commonly used molecular tools. After an initial colonization step by these non-symbiotic heterotrophic microorganisms we observed the development of a chemoautotrophic bacterial mat that takes advantage of the reduced compounds produced by the wood microbial community. Finally, we showed that the environmental engineering conducted by wood borers significantly changed the wood's environmental conditions and therefore selected different microbes from the seawater seed bank. This last selection of ultra-rare microbes will define the wood parts that can host chemosynthetic lifeforms for the rest of the wood fall biocenosis lifetime.