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Microbial diversity and activity in cold-water coral reef ecosystems

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The potential of key ecosystems like cold-water coral reefs to foster enhanced species diversity in the ocean is undisputed. However, little is known about the putative role that cold-water coral reefs play as biodiversity hotspots for the “unseen majority” in the oceans: prokaryotic communities. Our current efforts within the European Science Foundation project MiCROSYSTEMS evolve around the central question, if cold-water corals act as ecosystem engineers in the reef environment by shaping microbial diversity, functionality and activity via habitat differentiation and release of organic matter. Pilot studies in 2006/2007 revealed that bacterial communities may associate very specifically with distinct microbial habitats generated by the reef-building coral *Lophelia pertusa*, such as the coral skeleton surface, mucus and tissue compared to ambient sediments and seawater. In particular, mucus continuously released by the coral was characterized by distinct and very diverse bacterial patterns, and has shown to act as possible energy vector from corals to microbes which may influence microbial activity in reef waters. Whether these trends have a general validity for cold-water coral reef ecosystems is currently under investigation in more extensive studies targeting the microbial diversity and activity along horizontal and vertical gradients in two reefs off Northern Norway. *In situ* samples comprise the cosmopolitan corals *Lophelia pertusa* and *Madrepora oculata* as well as reef-associated sediments and seawater. The combined application of high-resolution molecular techniques, multivariate statistics and biochemical analyses of coral-derived microbial habitats and organic matter

is expected to give valuable insights into the habitat-specific community structure, dynamics and potential function of prokaryotes in cold-water coral reefs ecosystems.