iFAST: The International Forum on Advanced Environmental Sciences and Technology

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8 a.m. CST, 9 a.m. EST, 2 p.m. GMT, 10 p.m. China
Wednesday, Nov. 20, 2024

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https://marine.rutgers.edu/deep-seamicrobiology/

Costantino Vetriani is a professor in the Department of Biochemistry and Microbiology and the Department of Marine and Coastal Sciences at Rutgers University. Vetriani completed his undergraduate and graduate degrees at the University of Rome, Italy. There, he began his research career in a clinical microbiology lab and, as a doctoral degree student, he was trained as a prokaryotic molecular geneticist. In 1995 he moved to the United States, where he joined Frank Robb's laboratory at the former Center of Marine Biotechnology in Baltimore, Maryland and, later, Rutgers University. Research in Vetriani' s laboratory focuses on the microbiology of deep-sea and coastal hydrothermal environments. Since 1996, he participated, either as research or chief scientist, in over 20 deep-sea expeditions in the Pacific and Atlantic oceans, and in the Mediterranean Sea, and he had the opportunity to explore the deep ocean aboard in the Deep-Submergence Vehicles Alvin and Nautile. Vetriani is a passionate scuba diver and underwater photographer.

The Microbial Contribution to the Carbon, Sulfur and Nitrogen Cycling in Marine Hydrothermal Systems

Abstract: Chemosynthetic microbial biofilms colonize mineral and biological substrates exposed to fluid circulation at deep-sea and coastal hydrothermal vents, providing a biologically active interface along redox boundaries. In this talk, I will discuss the contribution of these microbial biofilms to the carbon, sulfur and nitrogen cycles, using two case studies: In the first part of the talk, I will discuss the structure and function of chemosynthetic microbial biofilms collected from the East Pacific Rise (9°50 N, 104°17 W) deep-sea vent system. 16S rRNA-based amplicon sequencing revealed that *Campylobacterota* of the *Sulfurimonas* and *Sulfurovum* genera dominated newly formed biofilms, and statistical analyses suggested that community composition is significantly impacted by biofilm age, temperature and sulfide concentration. Further, we observed key changes in gene expression in biofilms during the transition from the shallow subseafloor to the seafloor. In the second part of the talk, I will discuss the ecological succession and function of chemosynthetic biofilms from a coastal gas vent system in Italy. Our findings indicate that inorganic reduced sulfur species are the main electron donors and CO_2 the main carbon source for these biofilms, which conserve energy by oxygen and nitrate respiration and fix dinitrogen gas. Overall, our work provides a novel conceptual framework for evaluating biofilm structure and function in marine hydrothermal systems by showing a transition from a niche-specific pioneer microbial community in newly formed biofilms, to a complex population of increased diversity in established biofilms..

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