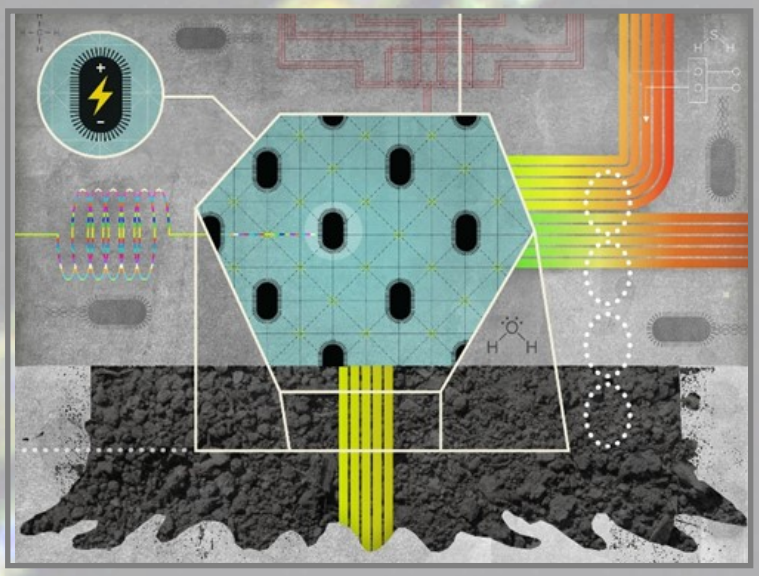
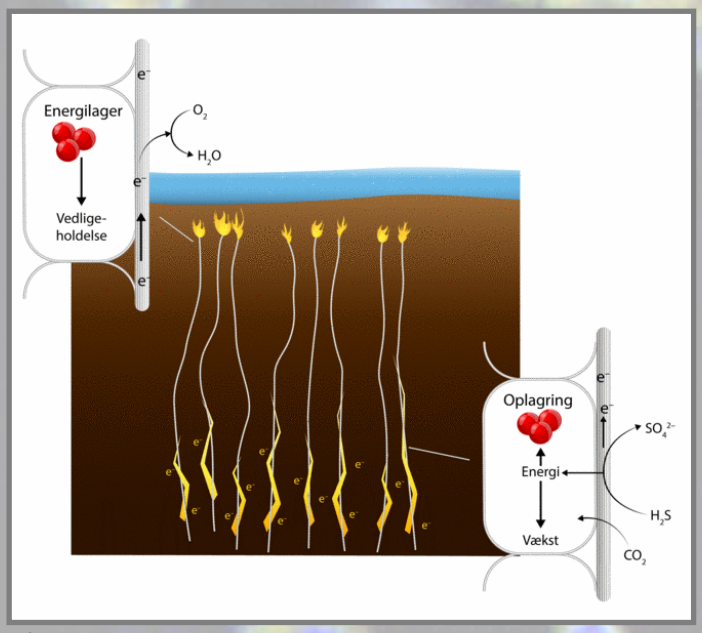
Highlights - Center for Electromicrobiology

Electromicrobiology 2019 conference



An artist's illustration of our electric planet where different bacteria with internal or external electric wires interact to drive ecological processes (© Gordon Studer, New York Times)

Some bacteria can produce or live off electrical currents, and thereby take advantage of many more processes than previously thought. But who and where they are and how they accomplish this remain as challenging questions to science. Therefore, 100 researchers from all over the world and many disciplines were attracted to the very first conference on electromicrobiology held in Aarhus by The Center for Electromicrobiology and the Danish National Research Foundation. The answers to who, where and how in electromicrobiology were overwhelming: from the deep subsurface and contaminated rivers to biofilms and biogas reactors, from photosynthetic and metal-cycling bacteria to dangerous bacteria in the body. What biological molecules conduct electrons and by what mechanisms were especially hot topics with implications for a bioelectronics future. Contrasting results were exposed and although not resolved, they inspired more research and collaboration. Another interesting topic was the centimeters-long cable bacteria with internal electric wires. This weird form of life was discovered by present researchers at the Center for Electromicrobiology and actually in Aarhus Bay, right outside the windows of the conference.



Simplified model of how multicellular cable bacteria might work in the sea bottom. The top cells get electrons from the common wire to reduce oxygen without associated growth. Instead, the cells in the bottom get virtually all the energy and grow, as they oxidize hydrogen sulfide while giving off electrons to the wires.

Publication: On the evolution and physiology of cable bacteria

Cable bacteria metabolize oxygen and sulfide at each end couple the two processes with an electric current. The new paper from CEM (Kjeldsen, Schreiber et al., PNAS) is a comprehensive study of genes, proteins, and cells of these living wires and surprisingly it showed that they do not possess the canonical pathways for the two processes. In spite of this, the researchers managed to come up with a consistent, hypothetical metabolic model of how cable bacteria may work and this will serve as a blueprint for many future experimental tests. Intriguingly, the putative electron conductor is a type of protein that few researchers in the field believe can work.