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New microbe strain can make more electricity

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Washington, August 2 (ANI): In new experiments with Geobacter, the sediment-loving microbe, Derek Lovley and colleagues at the University of Massachusetts Amherst supervised the evolution of a new microbe strain that dramatically increases power output per cell and overall bulk power. It also works with a thinner biofilm than earlier strains, cutting the time to reach electricity-producing concentrations on the electrode. "This new study shows that output can be boosted and it gives us good insights into what it will take to genetically select a higher-power organism," said Lovley.Findings open the door to improved microbial fuel cell architecture and should lead to "new applications that extend well beyond extracting electricity from mud," according to Lovley. In the new experiments, the UMass Amherst researchers adapted the microbe's environment, which pushed it to adapt more efficient electric current transfer methods. "In very short order, we increased the power output by eight-fold, as a conservative estimate," said Lovley. "With this, we've broken through the plateau in power production that's been holding us back in recent years," he added. Now, planning can move forward to design microbial fuel cells that convert waste water and renewable biomass to electricity, treat a single home's waste while producing localized power, power mobile electronics, vehicles and implanted medical devices, and drive bioremediation of contaminated environments.Geobacter's hairlike pili are extremely fine, only 3 to 5 nanometers in diameter or about 20,000 times finer than a human hair, and more than a thousand times longer than they are wide. Nevertheless, they are strong. Nicknamed nanowires for their role in moving electrons, pili are the secret to this particular microbe's ability to produce electric current from organic waste and sediment. Geobacter's pili seem critical for forming the biofilm which aids transfer of the electron products to iron in soil and sediment. The Geobacter biofilm's "fortuitous" electron-transferring skill, the product of natural selection, suggested a pathway to Lovley ? a way he might use selective pressure to increase its capacity to produce power. He and colleagues grew Geobacter as usual on a graphite electrode, providing acetate as food and allowing a colony to form the biologically active slime, or biofilm where electron transfer takes place across the nanowires. But, for this new experiment, they added a tiny, 400-millivolt "pushback" current in the electrode that forced Geobacter to press harder to get rid of its electrons. The result of providing a more challenging environment, within five short months was evolution of a beefed-up microorganism that can press at least eight times more electric current across the electrode than the original strain. (ANI)

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