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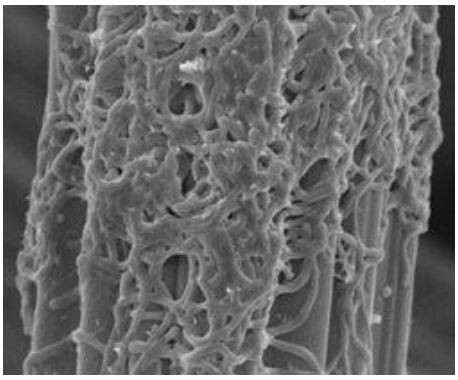
Sweet-toothed microbe tapped for power

Peter Weiss

A whip-tailed bacterium wrenches electrons from sugars so effectively that researchers have harnessed the organism to make an extraordinarily efficient fuel cell.



STICKY SWEET. Clinging to a graphite electrode roughly 15 micrometers in diameter, clumps of sugar-munching bacteria shunt electrons from a sweet solution directly into an electric circuit.
Lovley and Chaudhuri

As many fuel cells do, this tabletop device includes two membrane-separated chambers, each one containing an electrode immersed in an aqueous solution. To one chamber, Swades K. Chaudhuri and Derek R. Lovley of the University of Massachusetts–Amherst added the bacterium *Rhodoferax ferrireducens*. The microbes pump more than 80 percent of the glucose's removable electrons from the chamber's liquid into an electric circuit, the scientists report in the October *Nature Biotechnology*.

That process is slow, however, so the new fuel cell generates just enough electricity to run a pocket calculator.

Microbial fuel cells have previously achieved sugar-to-electricity conversion efficiencies of up to 50 percent. However, those performances were attained only by adding so-called mediator compounds that shuttle electrons between the electrode and the microorganisms. Many of those shuttle compounds, which are not needed with *R. ferrireducens*, are poisonous.

Collaborating with other scientists, Lovley only recently discovered *R. ferrireducens* and other bacteria that can hand off electrons directly to electrodes (SN: 7/13/02, p. 21: Available to subscribers at http://www.sciencenews.org/20020713/fob5.asp). Among those microbes, *R. ferrireducens* is the first with a sweet tooth, enabling it to exploit the sugars even in potential fuels including grass clippings and crops such as corn, says Lovley.

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References and sources for this article

References:

Chaudhuri, S.K., and D.R. Lovley. 2003. Electricity generation by direct oxidation of glucose in mediatorless microbial fuel cells. *Nature Biotechnology* 21(October):1229-1232.