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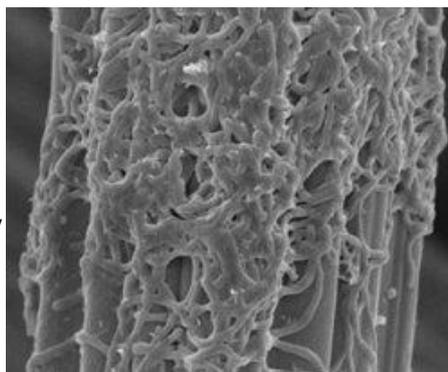
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Sweet-toothed microbe tapped for power

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.

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 *Rhodospirillum rubrum*. 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*.



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

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.

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