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► **COVER:** 'Electric daydream' by Tom Wilson, inspired by the review on p497.



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**A**lthough it has long been known that some microorganisms can produce electrical energy, attempts to use these so-called microbial fuel cells as 'biological generators' have so far met with limited success. But the recent emergence of a new metabolic class of electricity-producing microorganisms has put the spark back into this area of research. Dubbed the electricigens, these bacteria, which include *Geobacter* and *Rhodoferrax* species, have important properties that allow the effective conversion of diverse organic matter to electricity. They oxidize a wide range of organic compounds to carbon dioxide, and instead of relying on electron-shuttling intermediates, transfer electrons directly to the electrode. Importantly, during this form of respiration, the bacteria conserve energy for growth, endowing the system with long-term sustainability.

On page 497, Derek Lovley reviews the physiology and ecology of electricigens and describes strategies to increase the power output of these microbial fuel systems. Although the generation of large amounts of electricity from microorganisms is a long way off, electricigens offer a tantalizing glimpse of the potential applications of microbial energy.

On page 556, we cast thoughts of 'bug juice' aside to confront the reality of bacterial antibiotic resistance. Bruce Levin and Daniel Rozen discuss the phenomenon of non-inherited antibiotic resistance, in which bacteria are genetically susceptible, but phenotypically refractory, to antibiotic action. The authors use mathematical and computer modelling to show that this lesser-known form of drug resistance can have important clinical consequences, ultimately leading to treatment failure and the generation of inherited resistance. Levin and Rozen contend that significant progress in the development of new antibiotic regimens will only be made with an increased awareness and understanding of all forms of non-inherited antibiotic resistance.

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