IN brief

Algal biofuels questioned

Large-scale production of biofuels from algae is unsustainable using existing technologies, says a report by the National Research Council of the US National Academies published in October. The authors base their conclusions on the water, energy and nutrients required to grow and harvest enough algae to meet 5% of US transportation fuel needs. "Algae have to get an order of magnitude better before they are sustainable," says Mark Jones, one of the report's authors and a research fellow at Dow Chemical. "We are not looking for a single minor tweak, but improvements that really move the needle." Algae can be grown in many ways—in freshwater, saltwater or wastewater; in closed photobioreactors or open ponds. One key advantage of algae is that its cultivation does not require cropland. But other resources are needed, and the amounts of these resources vary widely from one algae production pathway to another. For instance, between 3.15 and 3,650 liters of freshwater are needed to produce the algal biofuel equivalent to 1 liter of gasoline using current technologies, the report found. For comparison, 5–2,140 liters of water are needed to produce a liter of corn ethanol and 1.9–6.6 liters are needed to produce a liter of petroleum-based gasoline. In another blow to the algae field, human genome pioneer Craig Venter said in October at a talk in San Diego that algal biofuels "are just dead" unless the federal government sets an effective carbon policy. "It doesn't matter what the scientific breakthroughs are, there's no way to beat oil," he said. Venter is CEO of La Jolla–based Synthetic Genomics, which partnered with ExxonMobile to develop algae-based biofuels. Despite the bleak outlook, algal biofuel developers press on. San Diego–based Sapphire Energy in October announced a partnership with the Institute for Systems Biology (ISB) in Seattle. The company is paying the institute to investigate algal gene networks in an attempt to find ways to optimize oil yields. When *Nature Biotechnology* asked ISB's founder, Leroy Hood, if algae is a viable route to biofuels, he said, "I'm agnostic on that.... I'm not going to say algae is going to be the optimal choice, but it's a good candidate." The national research council report notes that none of the sustainability concerns are a definitive barrier to future production of algal biofuels, but significant biological and engineering innovations will be needed to mitigate demands on resources.

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IN their words

"Everybody was doing advanced biofuels back then," recalls Christophe Schilling, the CEO and co-founder of San Diego–based Genomatica, as BP announces its intention to scrap a five-year-old agreement with another San Diego–based biofuel company, Verenium. (*Xconomy*, 21 November 2012)

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