IN brief

Biofuels, take two

The next-generation biofuels industry got a boost in May when Congress passed new laws under the 2008 Farm Bill that support the use of lignocellulosic feedstocks. The bill creates a tax credit of $1.01 per gallon of cellulosic ethanol, decreases the tax credit for corn-based ethanol by six cents to $0.45 and provides $320 million in loan guarantees for the construction of next-generation biofuels plants. It also increases to $120 million funding for R&D in feedstock development and biofuel production efficiency and provides payments to farmers near biorefineries to help them transition to energy crops. Key are the bill's incentives for farmers to commit to growing energy crops before biorefineries are built. "It's difficult to put up a biorefinery until you have an assured supply of biomass. But it's difficult for growers to want to plant large acreage of dedicated energy crops until they're assured a market in the form of a biorefinery," says Anna Rath, vice president of commercial development at Ceres, in Thousand Oaks, California. "So from our perspective, the [farm bill] takes care of that chicken-and-egg problem." President George Bush vetoed the bill May 21, saying it would subsidize wealthy farmers, including married couples making up to $1.5 million per year, and allow crops to be subsidized at any price. Congress the next day overrode the veto, enacting 14 of the bill's 15 titles. The bill, as of press time is expected to be passed into law. *—Emily Waltz*

50 cancers to be sequenced

The recent launch of the International Cancer Genome Consortium (ICGC) looks set to flood DNA databases with unprecedented genomic detail on up to 50 types of cancer. The initiative—a collaboration of more than a dozen major research organizations around the globe—will generate a "comprehensive description of genomic, transcriptomic and epigenomic changes in 50 different tumor types and/or subtypes." Each member is expected to take on one or more cancers from a list agreed by the ICGC who will coordinate the program. Each project will involve sourcing and sequencing both tumor and non-tumor tissue from some 500 patients at an estimated cost of around $20 million. Participants are expected to find their own funding and, to maximize the public benefit, will not file any patent applications. Instead, the data will be made available to selected investigators. Some question whether this money—the total cost is $1 billion—is well spent. Only in part, says Stephen Elledge of the Center for Genetics and Genomics at Harvard Medical School in Boston. "If the goal is to cure cancer and not just to describe it, there needs to be more money for functional genomics rather than just sequencing," he says. The consortium, which includes institutes from Canada, China, France, India, Japan, Singapore, the UK and the US, is about to begin the process of selecting which cancers will make it onto the sequencing shortlist. *—Henry Nicholls*

Table 1 How the substitutes line up[a]

Company	Development phase (country)	Product
Biopure	Launched (South Africa) Phase 3 (Canada)	Hemopure
Northfield Laboratories (Evanston, Illinois)	Phase 3 (US)	PolyHeme (glutaraldehyde-polymerized human hemoglobin modified by pyridoxylation)
Sangart (San Diego, California)	Phase 3 (multicenter, Europe)	Hemospan PS (polyethylene glycol cross-linked human hemoglobin)
HemoBioTech (West Dallas, Texas)	Phase 1 (Zaire)	HemoTech

[a]Clinical development of Hemolink (*O*-raffinose cross-linked human hemoglobin) by Hemosol Biopharma (whose assets were acquired from Hemosol Corp, Mississauga, Canada, in July 2007) was discontinued in 2005; Baxter International's HemAssist program was discontinued in 1998.

theory, remain in the circulation longer. This approach was taken by Deerfield, Illinois–based Baxter's pioneering product HemAssist (diaspirin cross-linked hemoglobin), which was purified from donated human blood. HemAssist ran into trouble, however, when trauma patients receiving it in clinical trials died at higher-than-expected rates. Baxter terminated the product voluntarily in 1998.

Although it has never been confirmed, scientists suspect HemAssist's clinical setbacks—and those of subsequent HBOCs—resulted from vascular hypertension caused by constriction of patients' blood vessels. Schechter says the hypertension probably occurs because free hemoglobin also binds to, and inactivates, nitric oxide, which helps regulate vasodilatation. Nitric oxide binding—a major concern at the FDA meeting—continues to plague blood-substitute companies today. Barry Scott, the vice president for business development at Biopure, argues these concerns are likely to be overblown. However, a US Navy protocol for testing Biopure's product, Hemopure (glutaraldehyde-polymerized bovine hemoglobin modified by pyridoxylation), in clinical trials was put on hold in 2002. Although the Navy still argues in favor of testing Hemopure, neither Biopure nor the FDA would comment on the rationale for halting the protocol.

William Hoffman, formerly Biopure's Chief Medical Officer and now medical director of intensive care at Massachusetts General Hospital, blames the harmful reactions developed in a clinical trial involving anemic patients who were given Hemopure during orthopedic surgery. Biopure continues to offer Hemopure to US hospitals for trauma treatment on a compassionate-use basis. "We don't deny that Hemopure binds nitric oxide; all [HBOCs] do," Biopure's Scott says. "We know what the potential adverse events are, but you'll get adverse events with any clinical product. Our aim isn't to reproduce blood; we're merely aiming to bridge clinical care until real blood is available."

Other companies claim they're now 'decorating' hemoglobins with molecules to limit nitric oxide binding. San Diego–based Sangart, for instance, expands the radius of its HBOC, Hemospan, with polyethylene glycol, explains H. Franklin Bunn, a Harvard Medical School professor who sits on the company's advisory board. Bulking Hemospan with polyethylene glycol distances

SELECTED research collaborations

Partner 1	Partner 2	$ (millions)
Alnylam (Cambridge, Massachusetts)	Takeda (Osaka, Japan)	1,000
Symphogen (Lyngby, Denmark)	Genentech (S. San Francisco, California)	*
DuPont (Wilmington, Delaware)	Genencor (Rochester, New York)	140

* Financial details not disclosed.