

Diversa restructures, raising question over bioprospecting

Diversa of San Diego, California, announced restructuring plans on January 5, 2006. Although officials insist that the company, a pioneer of both bioprospecting and industrial biotech, is not eliminating its research operations, it is certainly turning away from a rich heritage of scientific exploration. Its goal is both to conserve its dwindling cash pile and to concentrate on building up product sales more rapidly than it has managed to date. Diversa's peers and other stakeholders in industrial biotech will closely watch its progress and see whether it can reach its long-stated goal of becoming profitable by 2008.

Industrial biotech, long considered an exotic niche, is gaining increasing visibility and investor attention but it is still unclear whether independent biotechs operating in this space can attain the levels of success enjoyed by some of their drug-development counterparts. Though by no means free from significant obstacles, the path to profit in the pharmaceutical industry has been well trod.

In contrast, plotting a successful course in industrial biotech is a more hazardous undertaking. "Industrial biotech is different. It's much more broad and diverse, and harder to pigeonhole," says Brent Erickson, executive vice-president of the Washington, DC-based Biotechnology Industry Organization's industrial and environmental biotech section. "It's really about the technology diffusing into different manufacturing sectors."

Despite a few successes among companies who have established themselves in niche markets (**Box 1**), most industrial biotech companies have been slow to penetrate their target sectors. The malaise is not limited to small companies. In February 2005, Midland, Michigan-based Dow Chemical Company, pulled out of its bioplastic joint-venture Cargill Dow, citing slow sector maturation (*Nat. Biotechnol.* **23**, 638, 2005).

In the case of Diversa, its chief financial officer Tony Altig says that the problems that triggered its restructuring "are almost exclusively" company specific, and stem from an historic lack of focus. It now plans to target three broad areas—alternative energy, specialized industrial processes, and health and nutrition—and, if it can, to sell off programs outside of these areas. Nevertheless, the company still shares a major challenge with other players in the sector: persuading potential customers to abandon—or at least to adapt—tried-and-trusted industrial



Exploiting biodiversity found in the world's remotest region is no longer at the top of Diversa's agenda.

processes to accommodate innovative but unproven new technologies.

For example, Diversa has struggled to establish a foothold in the paper and pulp industry with Luminase, a xylanase enzyme it has developed to make pulp fiber more reactive to bleaching chemicals. That technology allows paper mills to reduce their consumption of polluting chlorine. Altig says that Diversa may consider acquiring a chemical distribution company with the kind of customer relationships that could further this particular franchise. In this market segment, which has a concentrated customer base, the company wants to be master of its own destiny.

In more diffuse markets like animal-feed additives, Diversa will continue to partner with larger players, such as Danisco, of Copenhagen, and Syngenta, of Basel, which are distributing its phytase products Phyzyme and Quantum Phytase, respectively. These facilitate digestion of dietary phosphate and reduce pollution. Incidentally, the latter product has been parked at the US Food and Drug Administration's over-worked Center for Veterinary Medicine for over three years.

Ultimately, the company's success will depend

on its ability to commercialize breakthrough products that enable totally new processes. Because of their novelty, these enjoy strong intellectual property protection. But it will continue to develop products that offer incremental improvements to existing processes. Its phytase animal-feed enzymes, indeed, are still responsible for the bulk of its product sales.

Diversa will also continue to enter research partnerships, says Altig, but will do so on a highly selective basis. That means eschewing much of the grant-funded basic research activity that has been one of the hallmarks of the company since its formation in 1994. "A lot of our grants were, to all

intents and purposes, science for science's sake and were not profitable," Altig says. Most of the 85 positions the company has eliminated are in defined programs—namely anti-infective drug development, small-molecule drug discovery and animal vaccine development—which it now aims to sell on to third parties. But it has also parted company with its scientific leadership, founder and former CEO Jay Short, who resigned in October 2005, and vice president of scientific affairs Eric Mathur, who left in early 2006.

Diversa's change of direction coincides with an unprecedented level of interest in industrial biotech, driven mainly by its potential to address the looming energy crisis. "I think that this past year was what you may call the tipping point for industrial biotech, and that was largely driven by uncertainties in the Middle East. Any place where we have oil being produced we have geopolitical uncertainty," says Roger Wyse, managing director at San Francisco, California-based investment bank Burrill & Co. "The momentum is shifting and things are beginning to move in industrial [biotech]."

Cormac Sheridan, Dublin

Box 1 Niche markets: a ticket to success in industrial biotech

Companies such as Codexis, a Redwood City, California-based spinout from neighboring Maxygen, and Senomyx, of San Diego, are expanding the reach of industrial biotech by pushing their technologies into highly defined niches. Codexis has developed a protein and strain engineering platform that can yield novel enzymes which are not found in nature. It is using these so-called 'biocatalysts' to improve the production of small-molecule drugs and has successfully deployed its technology in the production of the biggest small-molecule of them all: New York-based Pfizer's blockbuster cholesterol-lowering drug Lipitor (atorvastatin). Senomyx is applying cell-based assays and molecular screening technologies that are commonplace in drug discovery to the search for new flavor compounds, and has forged alliances with a clutch of giant food processors. CS