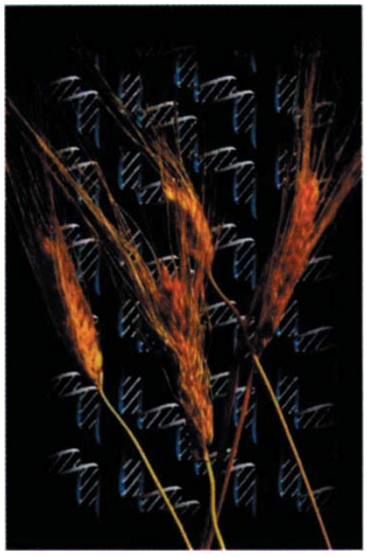
Millennium signs away plant kingdom to Monsanto

On October 28, Monsanto (St. Louis, MO) announced the formation of a wholly owned subsidiary to develop genomics-based plant and agriculture products in collaboration with Millennium Pharmaceuticals (Cambridge, MA). This five-year, $218 million venture takes Monsanto's investment and acquisition in seeds and agrochemical developments to nearly $2 billion over the past 18 months. Unlike genomics deals in the pharmaceutical sector, which typically are restricted to specific disease areas and geographical territories, this one gives Monsanto everything—exclusive access to Millennium's genomics expertise and technologies for all crop plants in all countries.



Monsanto gets worldwide rights on all crops under the new agreement.

"The formation of this subsidiary is an integral part of Monsanto's life sciences strategy," says Ganesh Kishpore, Monsanto's assistant chief scientist and chief biotechnologist, enabling the company "to dramatically accelerate the commercialization" of its products. Monsanto hopes the investment will provide a competitive edge in the search for patentable genes for agronomically important traits.

The new subsidiary will operate out of Cambridge, MA and will begin operations in 1998, ultimately employing 100–150 people. Monsanto will contribute $20–30 million each year to cover overheads such as staffing and research expenses, paying Millennium $38 million up front, and a further $16 million each year, for licensing in the genomics technologies. Millennium is also eligible for annual payments of $20 million based on the successful transfer and implementation of its technology platform in the subsidiary.

"The narrower profit margins and smaller number of companies in the agricultural sector meant that this type of deal was right for us," says Millennium's CEO Mark Levin. "There are simply fewer potential partners in this area than in pharmaceuticals. . .We chose Monsanto because it is going to be an important, maybe *the* most important, player in the area."

The agreement also grants Millennium rights to technology arising from the subsidiary for use outside agriculture, even by potential competitors of Monsanto. "We anticipate that information from the plant genomic program will be of wide relevance to internal programs at Millennium in a whole range of model systems," says Bill Timberlake, Millennium's chief discovery officer. This applies not only to information on plant genomes, but also to technologies that arise from the collaboration, such as a new computer algorithms. To avoid conflicts of interest, Millennium will not collaborate with Monsanto in areas in which it already has existing agreements with other pharmaceutical companies.

On the day before the Millennium deal, Monsanto's existing agreement with Incyte Pharmaceuticals (Palo Alto, CA) was extended to provide access to Incyte's high-throughput sequencing and bioinformatics technology to Monsanto's entire life sciences business. According to Kishpore, the new agreement also expands Incyte's sequencing effort to some additional crop species and new genes of interest. "Incyte's databases and sequencing programs will complement Millennium's sequencing, bioinformatics, and functional genomics expertise," he says. Both Incyte and Millennium will transfer their technology platforms to the new company.

"The new company will develop capabilities in genomic sequencing [focusing on ESTs and corresponding full-length genes], genetic and physical mapping of crop genomes, and expression profiling," says Kishpore. Several crops will be studied, including corn, soybean, wheat, rice, cotton, and potato (and to a lesser extent canola and tomato). Monsanto expects to apply genomics to enhancing crop yields; identifying a series of disease resistance genes; enhancing crop nutrient composition; "redesigning" crops so that, for example, they are more sturdy; and studying fungal, nematode, and bacterial genomes to help develop new pesticides.

The genetic and physical mapping efforts will allow the determination of gene organization at the genome level and the rapid identification of markers for breeding purposes, says Kishpore. This is particularly important in cereals because of the close synteny between different genomes. "The fact that the linear order of molecular markers is conserved among cereal species provides information on where equivalent genes are likely to be located in related crops," says Ben Miflin, director of the Institute for Arable Crops Research (Rothamsted, UK). "This is very important for cereals such as wheat where the genomes are so large and there is a lot of repeated DNA in the genome."

In addition to Millennium's expression profiling screens, and Affymetrix's DNA chips (through the Whitehead consortium), Monsanto also has access to Synteni's (Palo Alto, CA) gene expression microarray (GEM) technology via a deal negotiated last year. "Millennium also brings considerable expertise in the genetics and biology of fungal pathogens," says Timberlake, "And its high-throughput screening assays are readily amenable to the design of fungicides and pesticides."

Andrew Marshall

Financing doubts surround hundreds of German companies

According to members of the international investment community, many of the new biotechnology companies in Germany are seriously underfunded, unsustainable, and unlikely to succeed. Despite undoubted progress in Germany over recent years, some skepticism surrounds the recent optimistic claims of Jürgen Rüttgers, the German minister for education, science, research, and technology. In August, he said that 150 or so new biotechnology firms started in Germany in 1997 (or will start in early 1998). This took, he said, the total number of biotechnology companies in Germany to around 300 (*Nature Biotechnology* 15:943). In November, Ekkehard Warmuth, the director of the biological research and technology division of the ministry, told *Nature Biotechnology* that he believed the minister's estimate of 150 recent startups was realistic. Not only that, Warmuth expected the number of German biotechnology companies to rise to 600–700 over the next few years. But without an unfeasibly large injection of venture capital, these numbers seem very unlikely.