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BIO/TECHNOLOGY

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THE FIRST WORD/

MANUFACTURING PLANTS



ell, the set is finally complete. Wheat has yielded to genetic engine ing—joining soybean, rice, and corn among the principal staple cro successfully transformed and regenerated.

The first reports of those triumphs were published in these pages, and we've taken much satisfaction from basking in the glory that is properly theirs.

But we've taken our lumps, as well. Every time we run a crop plant or farm animal cover, it seems, we have some explaining to do: to readers and friends in the drug industry, to financiers who have abandoned agbiotech, to the ad sales staff, to our mother-in-law, to the little boy who lives down the lane. Yes, we say, most of our readers *do*work in pharmaceutical or closely related fields (though some 15 percent say they work primarily in agriculture, our second-largest reader group).

Actually, our coverage pretty well reflects the range of our readers' interests. So one or two covers a year should by rights emphasize agriculture.

But there's more to it than that. As we've said before, biotechnology is, at heart, precisely about the crossing of boundaries—the lines that divide discipline from discipline, country from country, species from species, and, to some extent, kingdom from kingdom

So agriphobes please consider:

First, plants hold at least as much potential as pharmaceutical production vehicles as do bacteria, or fungi, or even mammalian cells—especially now that plants have produced functional mammalian proteins ranging from growth factors to antibodies. Consider some of our recent "farming" papers: "Chemical regulation of *Bacillus thuringiensis* delta-endotoxin expression in transgenic plants" (S. Williams et al, 10:540, May '92) offers the first technology for chemically regulating protein production in plants. Last September's suite of papers on pharmaceutical protein produced in the milk of transgenic animals gave a clear glimpse of an alternative pharmaceutical future. These and dozens like them are not simply agricultural treatises—they propose bold new production technologies fully applicable to a pharmaceutical industry with (ahem) deep historical roots in the plant kingdom.

Second, biotechnology seems to be unifying agriculture, food processing, and pharmaceutical development, anyway. (See Russ Hoyle's commentary, "Eating Biotechnology," on the U.S. Food and Drug Administration's effort to integrate new rules on bioengineered food into its conceptual scheme.) Papers like "Production of the sweet protein monellin in transgenic plants" (L. Penarrubia et al, 10:561, May '92), offer the prospect of naturally sweet, low-calorie foods. Others, like "Fatty acid alteration by a delta-9 desaturase in transgenic tobacco tissue," (W.S. Grayburn et al..., in this issue), show the way toward growing plants with specified vegetable-oil profiles. Taken together, these and similar papers presage a time in which we will be able to tailor plants for combined nutritional, gastronomic, and even pharmaceutical characteristics.

Third, agriculture is by a long chalk the world's biggest industry. It may not boast the pharmaceutical business's profit margins or high technology—yet. But does anyone want to be left behind if the titan stirs?

And anyway, the science is tremendously interesting. With the conquest of wheat, the most important principalities of a vast kingdom lie at our feet.

Centocor's stumble. What biotechnology needs is a molecular H.L. Mencken—a bard of biology equipped to sourly review the field, bestowing brickbats (and the very infrequent rose) and letting the chips fall where they may. Sometimes we're just not up to the task, like a novelist grown too fond of his own characters, and find ourselves unequal to the foibles or failures of those we have watched nuture good little companies. So where the editorial form would demand Jovian thunder and crackling condemnation, we can muster only a pale sort of depressed regret. And rather than howling for the blood of Centocor's management (investors will undoubtedly do that), or anatomizing strategic and tactical errors (look elsewhere in this issue), we can only wish them well and hope for a complete and speedy recovery.

-Douglas McCormick