

HUEY HOUSE

INTERNATIONAL

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For many, this is going to be ancient news, but since we just found out about it this past month, we are including it in this month's newsletter. In the February 2003 edition of *Technology Review*, there is an article devoted to describing "10 Emerging Technologies That Will Change the World." Rather than recreate what was stated, the following is a quote from the overview, and then a quote from the section about glycomics which is a synonymous term for the term glyconutrients that we have been sharing for the past several months. I first give you the overview with appropriate highlights and underlines and then the section on glycomics:

Review Technology identifies the developments that will dramatically affect the way we live and work-and profiles the leading innovators behind them.

In labs around the world, researchers are busy creating technologies that will change the way we conduct business and live our lives. These are not the latest crop of gadgets and gizmos: they are completely new technologies that could soon transform computing, medicine, manufacturing, transportation, and our energy infrastructure. Nurturing the people and the culture needed to make the birth of such technological ideas possible is a messy endeavor, as MIT Media Lab cofounder Nicholas Negroponte explains in *Creating a Culture of Ideas*. But in this special section, *Technology Review's* editors have identified 10 emerging technologies that we predict will have a tremendous influence in the near future. For each, we've chosen a researcher or research team whose work and vision is driving the field. The profiles, on the following pages, offer a sneak preview of the technology world in the years and decades to come.

Glycomics

James Paulson, a researcher at the Scripps Research Institute in La Jolla, CA, lifts a one-liter, orange-capped bottle from his desk. The bottle is filled with sugar, and Paulson estimates that, had the substance been purchased from a chemical supply house, it would have cost about \$15 million. "If I could only sell it," Paulson jokes, admiring what looks like the chunky, raw sugar served at health food restaurants.

In fact, Cytel, a biotech company Paulson once helped run, synthesized the sugar-one of thousands made by the human body-with hopes it could be sold to truly boost health. Cytel's aim was to turn the sugar into a drug that could tame the immune system to minimize damage following heart attacks and surgery. That ambition failed, but the effort to understand and ultimately harness sugars-a field called glycomics-is thriving. And Paulson, who has gone on to cofound Abaron Biosciences in La Jolla, CA, is leading the way, developing new glycomic drugs that could have an impact on health problems ranging from rheumatoid arthritis to the spread of cancer cells.

The reason for the excitement around glycomics is that sugars have a vital, albeit often overlooked, function in the body. In particular, sugars play a critical role in stabilizing and determining the function of proteins through a process called glycosylation, in which sugar units are attached to other molecules including newly made proteins. "If you don't have any glycosylation, you don't have life," says Paulson.

By manipulating glycosylation or sugars themselves, researchers hope to shut down disease processes, create new drugs, and improve existing ones. Biotech giant Amgen, for instance, made a more potent version of its best-selling drug (a protein called erythropoietin, which boosts red-blood-cell production) by attaching two extra sugars to the molecule. Other companies such as GlycoGenesys, Progenics Pharmaceuticals, and Oxford Glycoscience have glycomic drugs in human tests for ailments ranging from Gaucher's disease to colorectal cancer. "The medical

potential...is absolutely enormous," says Abaron cofounder Jamey Marth, a geneticist at the University of California, San Diego.

Despite the importance of sugars, efforts to unravel their secrets long remained in the shadows of research into genes and proteins-in part because there is no simple "code" that determines sugars' structures. But over the last few decades, researchers have slowly uncovered clues to sugars' functions. In the late 1980s, Paulson and his team isolated a gene for one of the enzymes responsible for glycosylation. Since that watershed event, scientists have been piecing together an ever more detailed understanding of the ways sugars can in some instances ensure healthy functioning and in others make us susceptible to disease.

It's a gargantuan task. Researchers estimate that as many as 40,000 genes make up each person, and each gene can code for several proteins. Sugars modify many of those proteins, and various cell types attach the same sugars in different ways, forming a variety of branching structures, each with a unique function. "It's a nightmare" to figure all this out, says Paulson. "In order for the field to progress rapidly, we need to bring together the experts in the various subfields to think about the problems of bridging the technologies and beginning to move toward a true glycomics approach." In an attempt to do just that, Paulson heads the Consortium for Functional Glycomics. The group, comprising more than 40 academics from a number of disciplines, has a five-year \$34 million grant from the National Institutes of Health.

Despite this large-scale effort and healthy dose of federal funding, however, Paulson stresses that the consortium cannot detail every sugar in the body. "We're just taking a bite out of the apple." But what a sweet, large apple it is.

Jon Cohen Technology Review February 2003

As you can read, the field of glycomics or glyconutrients is one of the technologies that is going to have a profound influence on our world for years to come. It is our opinion that the Ambrotose glyconutrient products developed by Mannatech are some of the breakthroughs that this article refers to, because of the testimonies of many who have had significant physical help for their bodies by consistently using the Mannatech products. **You can not only start protecting your long term health circumstances, but also if inclined, take advantage of positioning yourself to at minimum, have your products paid for through the direct selling benefits.**

Please research out these products for yourself and if we can be of any help with your questions, please give us a call.

Blessings, Mark and Margaret
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