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Nanotechnologie im Nahrungsmittelbereich

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Quietly, Nanotechnology Enters the Food Chain

By BARNABY J. FEDER

What if the candy maker Mars could come up with an additive to the coating of its M&M's and Skittles that would keep them fresher longer and inhibit melting? Or if scientists at Unilever could shrink the fat particles (and thereby the calories) in premium ice cream without sacrificing its taste and feel?

These ideas are still laboratory dreams. The common thread in these research projects and in product development at many other food companies is nanotechnology, the name for a growing number of techniques for manipulating matter in dimensions as small as single molecules.

Food companies remain wary of pushing the technology — which is named for the nanometer, or a billionth of a meter — too far and too fast for safety-conscious consumers. But they are tantalized by nanotechnology's capacity to create valuable and sometimes novel forms of everyday substances, like food ingredients and packaging materials, simply by reducing them to sizes that once seemed unimaginable.

Most of the hype and a lot of the promise for nanotechnology lies in other industries, including electronics, energy and medicine. But the first generation of nanotechnology-based food industry products, including synthetic food colorings, frying oil preservatives and packaging coated with antimicrobial agents, has quietly entered the market.

The commercial uses of the technology now add up to a \$410 million sliver of the \$3 trillion global food market, according to Cientifica, a British market research firm that specializes in nanotechnology coverage. Cientifica forecasts that nanotechnology's share will grow to \$5.8 billion by 2012, as other uses for it are developed.

Aware of the adverse reaction from some consumers over the introduction of genetically engineered crops, the food industry hopes regulators will come up with guidelines that will also allay consumers' fears. That put a spotlight on the United States Food and Drug Administration's first public hearing on how it should regulate nanotechnology. No policy changes are expected this year.

"To their credit, the F.D.A. is trying to get a handle on what's out there," said Michael K. Hansen, senior scientist at Consumers Union, one of 30 groups that have signed up to speak at the meeting.

But coping with nanotechnology will be a daunting challenge for the agency, according to a recent report by a former senior F.D.A. official.

Michael R. Taylor, a former deputy commissioner for policy at the agency, said the F.D.A. lacked the resources and, in the case of cosmetics, dietary supplements and food, the full legal authority needed to protect consumers and also foster innovation.

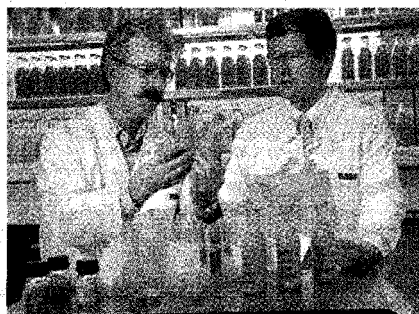
So far, there have been no confirmed reports of public health or environmental problems related to nanotechnology. But troubling laboratory tests suggest some nanoscale particles may pose novel health risks by, for instance, slipping easily past barriers to the brain that

keep larger particles out. Thus, the same attributes that could make the technology valuable for delivering drugs could also make it hazardous.

Simply defining nanotechnology may also be a hurdle. BASF has been widely considered a pioneer for products like its synthetic lycopene, an additive that substitutes for the natural lycopene extracted from tomatoes and other fruits. Lycopene, widely used as a food coloring, is increasingly valued for its reported heart and anticancer benefits. But BASF's particles average 200 to 400 nanometers in diameter, about the same as the natural pigment, and well above the 100-nanometer threshold that many experts consider true nanotechnology.

More important, everyone agrees that there have been few rigorous studies of the actual behavior of the newly engineered nanoscale materials in humans and the environment. Those that have been completed fall far short of duplicating the range of conditions the nanoparticles would encounter in general commerce. And few laboratory studies have focused on the fate of particles that are eaten rather than inhaled or injected.

The desire to avoid controversy has made even the largest food companies, like Kraft Foods, leery about discussing their interest in nanotechnology. Kraft, the second-largest food processor after Nestlé, was considered the industry's nanotechnology leader in 2000. That is when it announced the founding of an



BASF Beverage Lab makes drinks with synthetic beta-carotene, a nanoparticle.

international alliance of academic researchers and experts at government labs to pursue basic research in nanotechnology sponsored by Kraft.

The Nanotek Consortium, as Kraft called the group, produced a number of patents for the company, but Kraft pulled back from its high-profile connection with nanotechnology two years ago. Kraft still sends researchers to industry conferences to make what it calls "generic" presentations about the potential uses of nanotechnology in the food industry. But the company declines to specify its use of or plans for the technology.

F.D.A. officials say companies like Kraft are voluntarily but privately providing them with information about their activities. But many independent analysts say the level of disclosure to date falls far short of what will be needed to create public confidence.

"Most of the information is in companies and very little is published," said Jennifer Kuzma, an associate director of the Center for Science, Technology, and Public Policy at the University of Minnesota, who has been tracking reports of nanotechnology use in food and agriculture.

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