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Developments to Watch

Introduction

Some 6,000 people gathered in Boston in mid-February to hear the latest scientific insights at the nation's largest general research meeting, the annual conference of the American Association for the Advancement of Science. These are some of the highlights.
By Paul Raeburn

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Bacterial "Soup" for the War against Cavities

Researchers say they may be able to cut tooth decay by spraying teeth with a genetically altered microbe that replaces cavity-causing bacteria found naturally in the mouth. Dental cavities are the most common childhood disease in the United States, affecting 50% of 5- to 9-year-olds. And more than 90% of American adults have untreated cavities.

Nearly all dental cavities are caused by the microbe *Streptococcus mutans*, which produces acid that eats away at tooth enamel. Jeffrey Hillman, a biologist at the University of Florida and OraGen Inc., engineered a strain of the bacterium that does not produce acid but does make an antibiotic. The genetically engineered strain knocks out existing bacteria, and it should survive in the mouth for a lifetime after a single application in childhood, Hillman says.

Tests are now under way in rats. Human trials will begin soon, and the researchers may seek Food and Drug Administration approval at the end of the year.

The bacterial spray, which has been given to three human volunteers, tastes like "strong chicken soup," Hillman says, but it could be flavored.

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The antibiotic made by the altered bacterium may also be effective against other disease-causing bacteria beyond those in the mouth.

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Overfishing Threatens the North Atlantic's Future

The first study of the entire North Atlantic Ocean has found that the catch of tuna, haddock, cod, flounder, and other desirable fish plunged by more than half during the past 50 years. The drop has been so dramatic that the ocean can no longer sustain further catches. If fishing continues, the study's authors say, these fish could disappear.

"If you look at the North Atlantic oceanwide, the problem is huge," says Daniel Pauly of the University of British Columbia Fisheries Centre, who directed the 2 1/2 year study. The problem is being aggravated by \$2.5 billion in subsidies being paid to fishermen by the United States, Europe and Canada--subsidies that encourage overfishing by marginally profitable boats that would otherwise go out of business.

The only way to restore the depleted fish stocks is to create sanctuaries in the ocean where fishing would be permanently banned, Pauly says. Such reserves would nurture larvae and juvenile fish until they eventually migrated to areas where they could be caught legally.

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Smoother Ice Cream from Winter Wheat

It may be one of the most complex foods we eat--a combination of foam and emulsion whipped into a delicate web of fat, sparkling ice crystals, air bubbles, and a syrupy sugar solution.

The technical name for this ethereal mix? Ice cream. And the scientists who study it now say they may have a way to make it better.

The problem with making ice cream is keeping the ice crystals small. When ice cream is stored, the crystals grow larger, giving it a rougher texture. H. Douglas Goff, whose lab at the University of Guelph in Ontario is mostly dedicated to the science of ice cream, says adding winter wheat proteins can keep ice cream smooth and creamy longer.

Winter wheat sprouts in the fall, and contains proteins that protect it from ice and cold during the winter. When Goff and his colleagues put the proteins in ice cream, they found that the ice crystals remained small. "These proteins have a fantastic effect," says Goff. "Ice cream comes out very smooth and tends to stay that way." Several of Goff's colleagues have formed a company, Ice Biotech, to commercialize the research.

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DNA Mug Shots May Help Deter Bioterrorism

Decoding and analyzing the genes of microbes used as weapons will be a key defense against bioterrorism, says a leading expert on microbial genomes. Claire Fraser, president of The Institute for Genomic Research, says her lab expects to decode the anthrax genome by this summer, while within the next year, labs around the world will have decoded the genes of 70 microbes that attack people, animals, and plants.

Such data is needed "to trace the source of bioterrorist attacks, as well as to devise countermeasures to help deter those attacks," she says.

Recent advances in genetics could help terrorists design particularly nefarious bio agents, but the same advances also make it easier to develop drugs, vaccines, and detection methods to counter the threat. Other researchers warn that future attacks might rely not on exotic organisms like anthrax and smallpox but on common microbes like those that cause food poisoning. The release of such organisms might not cause widespread deaths but could wreak economic havoc if they triggered a panic among consumers.

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