

World Science News in Review

[Biological Sciences]

Measles Virus Shrinks Tumors



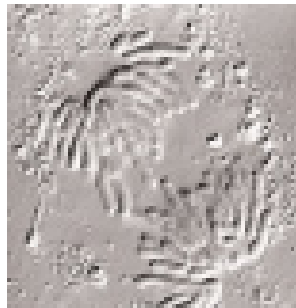
In the June 20 issue of *Nature*, Adele Fielding of the Molecular Medicine Program at the Mayo Clinic in Rochester, Minnesota, and colleagues discovered that the measles virus could help treat a type of cancer relating to the lymphatic system. The researchers were able to prove that the attenuated form of the virus can shrink human tumors that are implanted in mice.

Fielding expressed that she and her colleagues “will begin with a low dose of virus and stringent criteria for study enrollment” in the near future. She also expects the trial “will show this to be a safe approach” to treat cancer.

Other researchers have also showed interest in this study. Patrick Lee, who works on infectious diseases at the University of Calgary in Canada, believes that “identification of such a feature would represent a major milestone in cancer and virus research.”

Cancer Protein's Mutations Succeed in Temporarily Foiling Cure

Researchers working on a potent drug geared toward combating the malformed protein found in the cells of patients with leukemia found that the gene encoding the protein is the source of the resistance to the drug. Charles Sawyer of the University of California, Los Angeles and his team, who were included in an article published in *Nature*, remain hopeful because the resistance-causing mutation to the drug, ST1-571, has been traced.



Researchers have been extremely interested in this drug since its inception. Early testing with the drug rendered incredible results, according to the researchers: 90 percent of patients in the initial stages of the disease showed remission. But in recent studies, the drug was tested on patients at a more advanced stage of cancer, and many developed resistance to the drug.

The drug is designed to fit into the protein to inhibit the activity that causes chronic myeloid leukemia (CML). CML is responsible for 15 percent of all leukemias.

After having such discouraging results, Sawyer and his team found what he called the “silver lining in the cloud.” Studying the cells of these patients, it became apparent that drug resistance came from the gene that encodes the overactive protein itself. The gene undergoes a point mutation, which produces a misshapen protein no longer affected by the drug.

Currently, “it’s the first designer drug for cancer that’s a winner,” says CML researcher Junia Melo of the Imperial College School of Medicine in London. Until it can be further refined, however, patients are left only with the option of bone marrow transplants, but less than a third of patients are able to find viable matches.

Researchers around the world are hopeful that, given time, the proper adjustments to ST1-571 can be made. “You need a panel of drugs that can be combined or used alternately,” says Melo. In the meantime, the FDA has accelerated its review of the drug to make it an option for patients as soon as possible.

Efforts to Sequence Banana Genome Under Way

On July 19, a worldwide assembly announced plans to sequence the banana genome within five years. The group, led by International Network for the Improvement of Banana and Plantain (INIBAP) of Montpellier, France, will commence the sequencing endeavor with *Musa acuminata*, a species from which most bananas are descended.

The new genetic data may be used to aid the efforts of farmers in the developing world to produce a banana less susceptible to diseases and pests, as well as help compensate for the lag of the banana behind other crops.

Although the banana is the fourth most important crop in the world, it was bypassed during scientific efforts made in the mid-20th century known as the “green revolution.” The plant now suffers from the widespread black sigatoka fungus, which targets banana leaves.

Researchers hope to locate the genes that make wild species resistant to this fungus, with the long-term goal of creating new varieties that are less susceptible to disease. Genetic markers will allow plants with undesirable traits to be discarded before they reach maturity.



The possible consequences of the genome sequence may be more extensive than economic growth of the banana crop. Because they are seedless, bananas grown as crops do not transfer genetic material during reproduction. Thus, the genome has changed relatively little over thousands of years, permitting possible use as a measure of the extent to which wild bananas have changed due to diseases and pests. Because there is no similar condition in other major world crops, the banana genome may prove to be extremely important to comprehension of genomics in general.

Nonstick Is Not So Slick



Let's face it: nonstick frying pans are a godsend to anyone who lacks cooking abilities.

But a group of Canadian researchers just ruined our stovetop savior. Scott Mabury and his University of Toronto team, who have been researching fluoropolymers such as Teflon, say that under high heat (e.g., on the stove) the polymers that coat

our nonstick pans can break down and release trifluoroacetic acid (TFA). TFA is the same substance produced when ozone-eating chlorofluorocarbons (CFCs) are released into the air, and thus it could have similar long-term environmental consequences.

Mabury and his colleagues reported in the July 19 edition of *Nature* that they performed the simple experiment of heating a number of commercial products containing fluoropolymers. They cooked motor oil, frying pans, surgical needles, and countless other items to temperatures between 360 and 500 degrees Celsius—similar temperatures, they claim, to those used to burn domestic waste.

When the team looked at the released products, they were surprised to find enormous quantities of TFA, which they also found contaminating their local Toronto rainwater. TFA loiters almost indefinitely in soil and water; hence the substance might have all sorts of yet unpredicted effects on human health and the environment.

"We're using compounds that persist in the environment for very long periods of time," says Mabury. "The issue for society is: Is this something we need to deal with?"

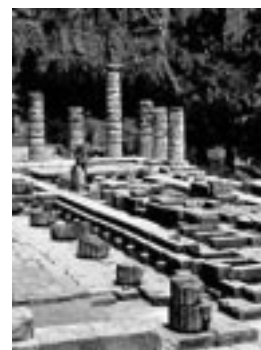
Some people laughed at Mabury's warning. Archie McCulloch, an environmental consultant in Northwich, England, who worked on a 1999 assessment of TFA, claims that the oceans hold huge amounts of natural TFA and that the acid seems to have no affect on marine wildlife.

But even if TFA isn't an imminent danger, Mabury's team found that the decomposition of fluoropolymers also released other toxins, including long-chain perfluorocarboxylates. The substance long-term effects are unknown, and Mabury says it's worth investigating.

[Physical Sciences]

Seismic Activity Induces Ancient Prophecies

The Oracle of Delphi was a major religious center for the ancient Greek and Roman world for a period of 2000 years. Thousands of people sought the oracle's wisdom concerning private and political matters. However, in *Nature*, Philip Ball reported that the prophecies and advice the oracle administered may have been nothing more than hallucinations induced by vapors diffusing through seismic faults beneath the temple.



Last year, Luigi Piccardi, a geologist in Florence, Italy, suggested that "the idea for the mythical chasm might have been prompted by a rupture opened by a massive earthquake in the region, similar to the one in 373 B.C. that destroyed nearby cities on the Gulf of Corinth."

This past summer, Jelle de Boer of Wesleyan University discovered a seismic fault directly beneath the temple at Delphi. This fault contains bitumen-rich limestone, which is very permeable to gases and groundwater. Any seismic activity on or near the surface of the fault would generate light hydrocarbon gases that could easily escape through cracks in the limestone.

Additionally, water from a spring near the temple was found to contain methane and ethylene. Ethylene is a gas that stimulates the nervous system and was often used as an anesthetic. In small doses, ethylene produces a "floating sensation." Such a sensation could conceivably be perceived as divine intervention.

Ant Colonies Exhibit Collective Behavior

In *Nature*, scientists revealed how ants individually investigate their environments to find the most suitable nest site. Stephen Pratt of the University of Bath, UK, has been studying laboratory colonies of the European ant, *Leptothorax albigenis*. Pratt found that once an ant colony's nest is destroyed, "scout" ants individually inspect new nest sites.

If a "scout" ant finds a suitable new nest site, it returns to the old nest site and leads another ant to the new nest site. The second ant follows the first ant in a "nose-to-tail" procession. If the second ant does not find the new nest site suitable, both ants go in search of another potential nest site. If the second ant finds the new nest site suitable, it returns to the old nest site to lead a third ant to the site.

Once a majority of the ant colony finds the new nest site suitable, any ant arriving at the new nest site switches from leading other ants there to moving belongings such as larvae and eggs from the old nest site.

This collective behavior has incited robotics engineers and computer scientists to ponder how many little brains can solve complex problems. Pratt states, "There's an entire field developing based on ant algorithms."

Bose-Einstein Condensate Imploded

Elizabeth Donley and colleagues have obtained unexpected experimental results from imploding Bose-Einstein Condensates (BECs). In *Nature*, the imploded BECs were reported to eject random bursts of atoms and form a smaller BEC, with some atoms disappearing from sight. When the implosion was halted halfway, low energy streams of particles were ejected at varying angles, also to the surprise of the physicists.

A technique known as “Feshbach resonance” was used to increase the attractive forces between the atoms and overcome their “kinetic zero-point energy.” Kinetic zero-point energy is the motion all particles have based on quantum position uncertainty. This technique was used to produce implosions and also to relax the forces between atoms to halt implosions.

The Bose-Einstein Condensate is a collection of atoms that are supercooled in a vacuum to within a millionth of a degree above absolute zero. The atoms then behave like a single quantum mechanical object, although on a much larger scale, making BECs a great insight into the world of quantum mechanics.

The unexpected results of the group’s research will likely increase interest in Bose-Einstein Condensates and eventually lead to a better understanding of quantum mechanics.

Zeno and Anti-Zeno

Researchers at the University of Texas at Austin have vindicated two of the most counterintuitive theories of quantum physics. Scientist Mark Raizen and others have re-created the Zeno and the anti-Zeno effect in the same system.

The Zeno effect was named after a fourth-century philosopher who argued that motion is impossible. The Zeno effect states that frequent measuring of a quantum system will slow down and even stop movement or decay of particles from high-energy states to lower ones. The anti-Zeno effect as its name implies, predicts the opposite: that many measurements of a quantum system will speed up decay.

Experiments done by Raizen and colleagues trapped sodium atoms in a light wave. This creates a system of which atoms can move out only by tunneling (where particles pop through energy barriers that they theoretically cannot cross). This experimental quantum system helps scientists examine one of quantum computing’s greatest problems: faulty decay data.

Louder Speech Makes Voices More Musical



As people speak louder to be understood over background noises, their voices shift increasingly toward musical, according to Marin Braun of the Neuroscience of Music organization in Klassbol, Sweden. His study indicates that the speech of people reflects the pitches of music they commonly hear and that as they talk louder, they are more likely to hit pure notes—thus making their voices more musical.

A study of the recordings of fifteen Dutch people found that their normal speech tones corresponded to those of an international piano. The precision of their notes to those on a standard scale exemplifies that the speech of people reflects their music. As they talked loudly to be heard over noises, they were more likely to hit the pure tones A, C, D, E, F, and G, those most common in Western music.

Braun finds this as evidence of a “pitch imprint” music leaves on our minds, and he also cites the phenomena that people can sing their favorite songs usually “within about a semitone” of the original.

Future studies could seek to connect music with especially emotional speech patterns, attempting to prove that a standard scale of pitches is innate to all humans.

[Technological Sciences]

Four-Year Microsoft Antitrust Case Continues

On September 28, the latest development in the Microsoft antitrust case unfolded as the presiding federal judge ordered the company and the U.S. Justice Department to five weeks of intensive settlement talks. If no settlement is reached by the end of that time, a hearing will be scheduled to commence in March 2002 to decide how to control Microsoft’s violation of antitrust statutes.

U.S. District Court Judge Colleen Kollar-Kotelly told both parties that it is an “optimal time” for out-of-court settlement and that “if everybody is reasonable and acting in good faith,” a deal could be made, CNNfn reported. This latest ruling is a consequence of the June decision by the U.S. Court of Appeals for Washington, D.C., that prevailed over an earlier ruling by a lower court to break the company into two components. However, the Court of Appeals upheld the lower court’s ruling that Microsoft had maintained its monopoly in the computer-operating market illegally.

The Justice Department had decided that its goal is not the subdivision of Microsoft, but rather to change the way it conducts business. Andy Strenio, an antitrust lawyer with the firm Powell Goldstein Frazier & Murphy, said, “Both sides need to face the reality that this is probably their last best chance to craft something that’s not imposed by the courts. That’s a risky roll of the dice—to leave it in the hands of the judiciary.”

Settlements will also most likely involve Windows XP, the new operating system Microsoft is planning to release on October 25. Windows XP has been accused by some to be anticompetitive because it bundles software that is sold separately by rival companies. ■