

MICROBIOLOGY

Joan Arehart-Treichel reports from Dallas at the annual meeting of the American Society for Microbiology

Artificial lakes for treating pollution

Acid mine drainage looms as a growing environmental problem as the United States increases its use of coal. Coal contains sulfur, and bacterial oxidation can transform that sulfur into acid pollution, to then be carried off by streams and rivers. A solution for this pollution may now have been found by Aaron Mills of the University of Virginia at Charlottesville—artificial lakes that can isolate, dilute and neutralize the pollution.

For decades, mines on Contrary Creek in Virginia had been seeping acid pollution into the creek and in turn into the North Anna River, Pamunkey River and ultimately the North River, until an artificial lake was built in 1972. The lake helped siphon acid pollution from the creek. Mills has studied the ability of the lake to solve the acid pollution problem and reports that it has been highly effective. The pollution is now confined to Contrary Creek and the lake and does not extend into the rivers. What's more, the lake appears to be diluting and neutralizing the pollution. For instance, there are few microorganisms (which are sensitive to acid water) near where Contrary Creek pours into the lake. But further into the lake there are many. Also, three years ago few plants were in the lake near the creek. Now there are many.

Progress toward a gonorrhea vaccine

Although gonorrhea is the most commonly reported infectious disease in the United States, there is no vaccine against it. One of the reasons is that there is no animal model for gonorrhea study; another is that gonorrhea bacteria were only recently found to have hairlike proteins (pili) on their surfaces that play a role in causing infection. So the reason a gonorrhea vaccine made from killed gonorrhea bacteria failed to protect against gonorrhea in the 1960s may have been because it did not include gonorrhea bacteria pili.

In any event, progress is finally being made toward the development of an effective, and safe, gonorrhea vaccine by incorporating only select components of the gonorrhea bacterium in the vaccine. For instance, last year Edward Tramont and Jerald C. Sadoff of the Walter Reed Army Institute of Research in Washington and Charles Briton of the University of Pittsburgh conducted a small trial to see whether a vaccine made of gonorrhea pili was safe in humans and whether it raised antibodies against the pili. They found that it fulfilled both requirements.

And now Robert Seid of Walter Reed, along with Sadoff, is revising the vaccine in hopes of making it still more effective as well as safe. They detoxified lipopolysaccharides (other important components of the gonorrhea bacterium besides pili), then coupled the LPS's to pili since they had reason to believe that a LPS-pili vaccine would not only protect against local gonorrhea infection in the genital tract (as a pili vaccine alone would) but would also protect against invasive gonorrhea infection in the genital tract and other areas of the body. They have tested the LPS-pili vaccine in mice and have found that it raised antibodies against both the pili and LPS's. What's more, the vaccine produced another desirable effect: it enhanced antibody reaction to the pili.

Cigarettes, asbestos and cancer

It has long been known that a cigarette smoker exposed to asbestos is far more likely to die from lung cancer than a nonsmoker. The reason may now have been found by A.A. Roman-Franco and colleagues at the University of Puerto Rico School of Medicine in San Juan: Cells exposed to asbestos release hydrogen peroxide, which in turn acts on benzo(a) pyrene in cigarette smoke and turns it from a precarcinogen into a potent carcinogen.

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SCIENCE & SOCIETY

Confusing rule on computer processes

With the ubiquity of computers, industrial-process entrepreneurs may well find a Supreme Court ruling handed down this month more confusing than instructive. At issue was whether an advance in a process to cure synthetic rubber was patentable. A patent examiner rejected the patent claim on the grounds that it was merely for a computer program to operate a conventional process (computer programs—as mathematical formulas—are not patentable). The patent-appeals board agreed, but the Court of Customs and Patent Appeals reversed the decision, a ruling that the Supreme Court upheld on March 3.

What makes the 5-to-4 decision confusing is a contradictory reading on what the patent application was for. The ruling opinion claims the patent application was for a new rubber-curing process. But four of the nine justices read it another way. In their dissent, authored by John Paul Stevens, they said the applicants only updated a long-used curing-time estimate "by repetitively recalculating that time pursuant to a well-known mathematical formula in response to variations in temperatures within the [curing] mold." The applicant's process employed no change in rubber-curing chemistry, Stevens says, no new raw materials or equipment, and "teaches" nothing new "about the significance or effect of any process variable." In short, the applicants do not claim to have discovered anything new about the synthetic-rubber curing process, Stevens says. However, use of temperature monitors and computers to calculate curing times was sufficient for five of the justices to call the process new.

The high court could only rule on whether the patent application should have been thrown out—on the grounds that a computer program was at its heart. Now the patent office must go back and decide whether to issue a patent after all. With "novelty" and "nonobviousness" as the deciding issues, the patent office—as well as entrepreneurs—will find little help in the Supreme Court's opinions.

Pesty neighbors

Urban pests—rodents, insects and birds—are more than a nuisance, they constitute a demonstrated health hazard. Cockroaches, for example, have been shown to harbor three strains of polio virus, 40 species of disease-causing bacteria and eggs of seven species of disease-causing tapeworms. They can bring on allergic reactions in humans and seriously contaminate sterile hospital equipment. Yet a new National Academy of Sciences report says no federal and few state agencies may legally set urban pest-management policy. The report surveys the problem and existing research, then recommends federal action to protect urbanites from these pests and the health effects of toxic chemicals used to rout them.

Toxic resources

Stumped on who to call about studies involving Agent Orange or perhaps the health effects of ionizing radiation? The United Nation's World Environment Center has put together a directory of people pledged to help. Called Contact: Toxics, the 183-page guide gives addresses, affiliations and phone numbers (occasionally even home phones) for nearly 1,000 specialists in a wide range of fields to answer queries from professional researchers. Appendices list common toxic substances, important toxics-related federal statutes and phone numbers for hotlines and other emergency-response centers for hazardous incidents.

WEC stresses its guide is for professionals only, so the general public and students researching term-paper topics must take their questions elsewhere. Although the directory costs \$38 to \$50, reporters will receive it for free.

171