# Biomedicine

## Century-old bugs resist modern drugs

Canadian scientists say they have grown 142-year-old bacteria taken from the frozen bodies of two Arctic explorers who were part of Sir John Franklin's doomed search for a Northwest Passage connecting the Atlantic and the Pacific (1845-48). The bacteria showed a surprising resistance to modern antibiotics – a finding that may force scientists to revise current thinking about the mechanisms of resistance.

The knowledge may help researchers develop better antibiotics. "We're running out of weapons," notes Kinga Kowalewska-Grochowska, a microbiologist at the University of Alberta Hospitals in Edmonton, who reported the bacterial findings last month at the American Society for Microbiology meeting in Los Angeles. According to current theory, antibiotic overuse creates drug-resistant bacteria; the new research suggests resistance may be caused by more than one factor.

The Canadians traveled to Beechey Island in the Northwest Territory and removed tissue specimens from two crew members, William Braine and John Hartnell. Both bodies were well preserved, having been frozen since the explorers died in 1846. The tissue samples were kept frozen for transport and then cultured in the laboratory. The researchers grew six strains of a common intestinal bacterium, subjecting it to the antibiotics clindamycin and cefoxitin. The bacteria showed resistance to these drugs, an unexpected finding since the two men died before the development of antibiotics.

The Canadian team plans further research to unravel the mechanisms of resistance. One possibility, Kowalewska-Grochowska speculates, is that the men were exposed to some natural form of antibiotic. Another is that heavy-metal exposure creates resistant bacteria. Having eaten food stored in tin cans soldered with lead, both Hartnell and Braine had high levels of lead in their bones.

## More bad news for sun worshipers

Sunny skies are thought to boost the risk of cataract, a clouding of the lens that impairs vision. But past reports of that connection have relied on gross estimates of solar-radiation exposure, which don't show anything about an individual's sun proclivity. New research by Gwen W. Collman of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C., supports the sunshine-cataract link by looking at individual sun exposure.

"Our study showed a weak increase in the overall risk of opacities as lifetime exposure to the sun increased," Collman and her colleagues write in the November American Journal of Public Health. That risk may increase in the future if depletion of the ozone layer allows more damaging ultraviolet radiation into the atmosphere, Collman notes.

Collman and her team looked at 113 patients with cataracts and 161 controls, aged 40 to 69, who visited a private ophthalmology practice in Asheboro, N.C. All subjects estimated lifetime sun exposure by answering questions about how much time they spent outdoors. Patients also reported medication use and other factors that can affect cataract formation.

Collman's study echoes previous research showing that dark-eyed persons run a higher risk of cataracts. The brown- and hazel-eyed subjects in her group had more cataracts than did the blue-, gray- and green-eyed patients. She suggests melanin in the iris may absorb solar radiation, delivering more damage to the lens.

Collman and her colleagues say they were surprised to find that patients who used tranquilizers had a higher risk of cataracts, because previous studies had shown no such correlation. Collman notes that some tranquilizers are known to make people light-sensitive, but adds that further study is needed to verify her group's findings.

# Earth Sciences

*Richard Monastersky reports from Denver at the meeting of the Geological Society of America*

## Soil may signal imminent landslide

Loosened by rain or melting snow, ordinary soil on a steep hillside can suddenly turn into a lethal wave sweeping downward at speeds of more than 30 miles per hour. Now a team of geologists may have discovered a way of determining when hillsides are about to give way.

According to one theory about soil slides – a particular form of landslide – precipitation can free dirt and rocks by increasing the water pressure inside pores within the soil. As the water table rises and pore pressure climbs, friction holding the top layer of soil to the hillside begins to drop until gravity's pull overcomes it. While such a general theory would explain why the flow starts, geologists have not paid much attention to the details of the process, says Edwin L. Harp of the U.S. Geological Survey in Menlo Park, Calif.

By outfitting a hillside with pressure meters and then setting artificial landslides, Harp and his colleagues discovered that pore pressure did increase as expected when the water level rose. However, immediately before the soil started sliding, pore pressure took a nosedive. On a test slope in Utah, the pressure dropped 40 minutes before the slide. In an experimental California forest, the warning was shorter. The researchers believe the pressure drop signaled that soil was beginning to expand just before it started to slide.

Harp says some researchers have found this pressure drop in natural soil slides as well, but it will require much more work to determine whether the signal is common in many kinds of landslides. If so, it may be possible to set instruments into known slide areas – providing a short-term warning for an impending flow.

## Sand's incredible journey

As beaches along the East Coast erode, one might wonder if natural processes will replenish the disappearing sand. The answer, according to a Virginia geologist, is no – at least not until the next ice age lowers sea levels.

Dennis A. Darby of Old Dominion University in Norfolk, Va., bases his conclusion on a study of the origins of East Coast sand. By tracing certain iron-titanium sand grains, he found that most sand along the coast and continental shelf as far south as Hatteras, N.C., comes from the north – either from the drainage of the Hudson River or from glacial deposits along Long Island and southern New England. Previous studies had tracked northern sand only as far south as the Delaware coast.

For sand from the Hudson to reach the Carolina coast, it had to move in steps, possibly taking millions of years, says Darby. The reason is that as sand moves along a coast, water currents push it into large bays or estuaries such as the Chesapeake. An embayment will continue to fill with sand until sea levels drop and the accumulated grit is flushed down onto the continental shelf, says Darby. For this reason, sand can travel only as far as the next bay in a single glacial cycle. Darby concludes that most beaches will not receive a major restocking of sand until the next ice age.

## Swim at your own risk

To catch a glimpse of the most acidic lake ever reported, you have to climb to the top of Costa Rica's Poás volcano – but you'd better hurry because Laguna Caliente may not last long.

The lake, which has a pH slightly lower than zero, sits in a small pit in the crater of this active volcano and receives its acidity from volcanic gases. Last year, small geyser explosions started shooting water and sediments out of the lake. While lake depth measured 40 meters in 1987, the water level has dropped by 13 meters and the temperature has climbed from 62° to 70°C in the last year, report Gary Rowe of Pennsylvania State University in University Park and his colleagues.