

Briefings

edited by FAYE FLAM

OTA Gives One Thumb Up for Bio

These days, when it seems as if a major oil spill hits some coast every few months, it's little wonder that a simple, environmentally safe way to clean up such spills would attract a lot of attention. One such method is bioremediation, the practice of releasing or encouraging the growth of microorganisms that actually "eat" oil. In a recent report*, the congressional Office of Technology Assessment (OTA) cautiously endorses this approach but points out that it is, at best, an incomplete response to oil spills.

The basic premise of bioremediation is simple: Under the right circumstances, microbes can metabolize petroleum hydrocarbons into simpler end products such as car-

**Bioremediation for Marine Oil Spills*, U.S. Congress, Office of Technology Assessment, OTA-BP-O-70, May 1991.

bon dioxide and nontoxic water-soluble compounds. Real spills, however, present a number of problems. For one thing, crude oil contains a number of complex, hard-to-degrade hydrocarbons. Some, such as C₅-C₉ alkanes, are toxic to many species of bacteria; others, such as asphaltenes (tar) and resins, degrade very slowly. Heavy oils—or even light oils that have been subject to evaporation and dispersion—may contain up to 45% of such compounds. Furthermore, biodegradation is limited by the availability of oxygen and nutrients, ocean temperature, and the pH and salinity of the water.

Despite these pitfalls, OTA reports that some bioremediation efforts are showing promise, particularly those in which cleanup teams add nutrients to encourage the growth of indigenous bacteria. The most striking successes seem to involve digestion by microbes of toxic low-molecular-weight aromatic compounds. OTA notes, however, that findings in the field are still tentative and suggests that more research be devoted to the subject.

Queasy Riders

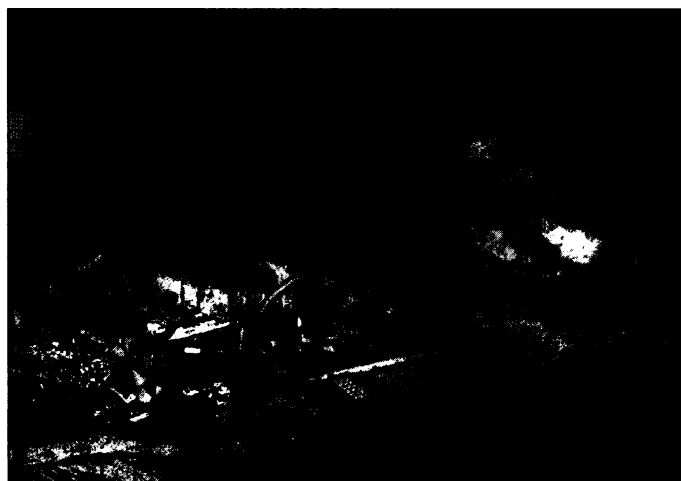
Between 50% and 70% of astronauts suffer from the misery of "space sickness," which can reduce work efficiency and make them feel miserable, says Laurence Young, an aeronautical engineer at MIT. He plans to learn more about the cause of this pervasive and sometimes debilitating ailment on the current space shuttle flight, using the crew of the shuttle Columbia as subjects. Young's project is part of a larger set of biology experiments on the current mission, known as Spacelab Life Sciences-1.

Space sickness, like seasickness, starts not in the stomach but the inner ear, says Young. People often get an upset stomach if actual or apparent motion upsets the inner ear's vestibular system—the apparatus that helps people sense motion and position.

That system doesn't work well in the zero gravity of orbit, and Young's experiments are designed to find out why. One experiment requires subjects to put their heads in a rotating, spotted dome. Another looks at the response to an actual rotation—the kind you feel if you spin fast in a swivel chair.

Young says such experiments may lead to simple techniques to avoid the sensory confusion that can lead to queasiness. For example, astronauts already know to limit certain types of head movements.

It will be easy to quantify the effectiveness of any space sickness remedy, thanks to Senator Jake Garn (R-UT), who suffered a bad case of space sickness on his shuttle flight. "We have an official unit of motion sickness," explains astronaut Jeffrey Hoffman. "We call it the Garn."



AP/Wide World Photos

Big heat. Houses burn as hot ash pours from Unzen.

Volcano Claims Scientists' Lives

In volcanology, a scientific misjudgment can cost you more than wasted time or misspent grant money. On 3 June, it cost volcanologists Harry Glicken and Maurice and Katia Krafft their lives. At about 4:00 in the afternoon a half-million cubic meters of Unzen volcano collapsed, sending hot ash racing down the Mizunashi River and into the town of Kamikoba, near Nagasaki, Japan. Thirty-seven people died, including journalists, rescue workers, local residents, and the three volcanologists who had come to study their killer.

Unzen had given plenty of warning that it was not to be completely trusted. In mid-1990, with a rumble of earthquakes, it had begun awaking from a 200-year slumber. In November the first ash erupted, and on 20 May lava began extruding near the summit. The resulting lava dome partially collapsed on 24 May, sending the first of several hot ash flows down the mountainside. The penultimate flow stopped 600 meters short of Kamikoba. As spring rains threatened to push ash into the town, as many as 3000 people were evacuated.

The volcanologists would have been the last to underestimate the continuing threat. Glicken, an American who was a visiting professor at Tokyo

Metropolitan University, narrowly escaped death 10 years ago at Mount St. Helens. And the Kraffts, who worked out of the Vulcain Volcanology Center in Cernay, France, are known worldwide for not only their science but also their filmmaking about volcanoes. But even volcanologists can fatally misjudge their subject.

Worse could still happen. Three months after the beginning of the previous eruption of Unzen, in 1792, a lava dome collapsed into the sea, unleashing tidal waves that killed 15,000 people. About 200,000 people now live around Unzen—and the eruption continues.

Suit Against NAS Dismissed

Victor Herbert—gadfly, nutritionist, attorney, hunter of quacks, and angry author who took the National Academy of Sciences (NAS) to court on a charge of plagiarism last year—received a major setback in his legal battle on 22 May. Judge Stanley Sporkin of the U.S. District Court for the District of Columbia dismissed his case for lack of jurisdiction.

Herbert claims that the academy wrongfully published parts of a chapter he wrote for the NAS's *Recommended Daily Allowances* in 1984. The academy had a contract with the Department of Health and Human Services to produce the report on

nutrition, and in this instance, the judge said, the academy was essentially acting as an arm of the government. In other words, Herbert had been wasting his time in district court and should go instead to the U.S. Court of Claims, where complaints against the government are filed.

Herbert calls this argument, first advanced by the academy's lawyers, a "devil-made-me-do-it defense." He has already filed a notice of appeal. As for the NAS, spokesman Stephen Push says: "Our position is that the academy is, at the very least, a co-owner of the copyright in the 1985 draft report [on nutrition]." If Herbert persists, the academy may yet have a chance to explain this theory in court.

Lost Fossil of the Oort Cloud?

The icy planet Pluto, loitering at the outskirts of the solar system, doesn't fit in with either the rocky inner planets or the gassy outer ones. "Why would this thing the size of Texas form out past all those gas giants?" asks astronomer Alan Stern of the University of Colorado. And why, he asks, does it spin on its side—more like a chicken on a spit than a planet—and have a moon, Charon, almost as large as the planet itself?

Stern explains these oddities by arguing that Pluto may not be so unusual after all. The planet and its moon may be relics of a swarm of proto-comets—two stragglers that got stuck in an odd place.

Stern bases his idea, which he described at a recent meeting of the American Astronomical Society, on computer simulations and speculation. He reasons that the early solar system might have included many Pluto-like icy bodies. Most of them got scattered far beyond Pluto's orbit, to the fringes of the solar system. There they ended up in the Oort cloud—a gathering of the icy snowballs that form the nuclei of comets.

Why didn't Pluto fly out into the Oort cloud too? The planet

and its moon got trapped in their unusual position, says Stern, when they fell into a gravitational resonance with Neptune, where they were poised between being pulled into their neighbor and being flung out of the solar system.

Stern compares Pluto to an ancient beast caught in a tar pit: It's the one specimen that got caught, but that's no reason to think it's one of a kind.

Muddled Signals on Biotech

In mid-May, a White House committee sent tremors through both the Environmental Protection Agency (EPA) and the biotechnology industry with a draft of a new set of guidelines for regulating the release of transgenic organisms. Both government and industry officials fear the new guidelines reflect a mid-stream shift in the White House position on biotech—a shift that could complicate and delay EPA efforts to get regulations off the ground.

The document, titled "The Scope of Federal Oversight to Regulation of Biotechnology: Planned Introductions of Organisms into the Environment," appears on stationery from the White House Office of Science and Technology Policy. But EPA and industry officials say they believe that the White House Council on Competitiveness, headed by Vice President Dan

Quayle, played a major role in the document. It instructs agencies not to regulate genetically engineered organisms unless there is "an unreasonable risk"—never defined in the draft.

EPA official Elizabeth Milewski is worried because the vaguely worded draft differs from an earlier—and somewhat more specific—document released last July, which she and her colleagues have been using for almost a year to guide regulations. "What does this mean to us?" she asks. "Do we have to go back to the drawing board?"

Richard Godown of the Industrial Biotechnology Association in Washington, D.C., worries that the new guidelines could delay the long-awaited regulations that must be issued before companies can start marketing products. Godown stresses the need for clear guidelines to help the regulating agencies—the EPA, the Food and Drug Administration, and the Department of Agriculture—come up with coherent, harmonious regulations.

White House officials say not to worry—the paper is just an early draft. But Milewski and Godown both fear that even with a lot of fixes, the document could leave regulators up in the air.

On the Paper Trail

When Helmut Abt of Kitt Peak National Observatory isn't observing stars, he says, he oc-

casionally observes scientists and their publishing habits. His own specialty, astronomy, has a distinctive publishing style, he told attendees at the May meeting of the American Astronomical Society in Seattle.

Abt attributes many of the differences to the fact that astronomy, unlike most other sciences, is a largely observational pursuit, devoid of experiment. Because those observations are made at a handful of sites around the world, astronomers publish an unusual proportion of papers jointly authored with colleagues from foreign countries. About 26% of astronomy papers are international collaborations, compared to about 12% of papers in biology and physics.

Astronomers also tend to publish longer papers than other scientists, perhaps because the scope and conclusions of astronomical observations can take longer to explain than the results of a clear-cut experiment. Another reason for the length of astronomy papers, Abt thinks, is that astronomers rarely subdivide large projects into many small papers.

Physicists, he says, are more likely to create multiple papers from a single project, sometimes calling the divisions "least publishable units." "In physics there are many people for each good idea," Abt says. "In astronomy, any researcher can get on one of about ten good projects."

Would any physicists care to do their own study?

Hot times in the LMC. Earthbound astronomers have long had difficulty seeing hot, energetic stars in the central region of the Large Magellanic Cloud (LMC), a nearby galaxy dominated by clusters of older red giants and supergiants that tend to outshine nearby younger stars. But when researchers pointed the Ultraviolet Imaging Telescope (UIT)—lofted into orbit last December aboard the Astro-1 shuttle mission—at the 30 Doradus cluster (right), they found hundreds of the hotter stars radiating furiously in the ultraviolet. Many of them are nearly 40 times brighter there than at visible wavelengths, says NASA astronomer and principal investigator Ted Stecher. Bypinning down the locations of these stars, Stecher's team has laid the groundwork for future studies by the Hubble Space Telescope, the UIT during the next Astro flight (Science, 31 May, p. 1249), and two other space-based ultraviolet instruments.

