Random Samples:

Where Was Chakrabarty's "Bug"?

In 1980 the U.S. Supreme Court ruled that genetically engineered life forms could be patented. Microbiologist Ananda Chakrabarty and his employers, General Electric, won this ground-breaking decision for an altered form of *Pseudomonas* bacterium that was useful for eating up oil slicks.

In 1989 the United States experienced its worst oil spill in history as 35,000 tons of crude oil from the *Exxon Valdez* filled Alaska's Prince William Sound. The oil-dispersing chemicals were used too late, in part due to fears about their potential hazards. So where was Chakrabarty's little *Pseudomonas* when it was needed?

Still at GE, it seems. Even though the high court ruled that the organism could be patented, that didn't mean it would ever get out of the test tube and into commercial use.

"We won the case, but we realized there were legitimate concerns about releasing genetically engineered organisms," says Chakrabarty, now of the University of Illinois. "But here it's 9 years later and we are nowhere."

Nor is Chakrabarty's "bug" going anywhere. "In 1981 we made it clear we had no plans to develop this thing further," says GE spokesman Peter Van Avery. "The business of fighting oil spills is beyond GE's scope."

Van Avery notes that the company explored licensing the bug or getting the U.S. Coast Guard to take over development, but found no takers.

Meanwhile, Chakrabarty has also developed a chemical from naturally occurring microbial mutations that has been proved effective in dispersing oil. Petrogen, Inc., an Arlington Heights, Illinois, firm, has the exclusive license to the product, but it, too, has no plans to market it anytime soon.

Petrogen president Paul Pretegar says the product is still in the market development phase, although the firm is talking with Exxon and others involved in the cleanup about possible applications. Since the product is not genetically engineered, it would face fewer of the regulatory obstacles that slow the introduction of genetically manipulated products.

"I am sitting here in academia, and it's very frustrating knowing that there is something we can do about this terrible pollution, and that nothing's being done," Chakrabarty says.

He is even less sanguine about the future of his bug. "Five years ago people would ask me when would I have a commercial application for my bug. I used to say, 'in a couple of years.' Now I don't even talk about it."

Earthling: Take Me to Your Teacher

Question on final exam for high school science course: "How far did Klaatu state he had traveled? Was his home planet inside or outside of our solar system?"

Not your everyday fill-in-the-blank. The question is based on "The Day the Earth Stood Still," the classic 1951 science fiction movie about Klaatu, an ambassador from another planet and his robot, Gort, who descend on Washington, D.C., bringing a message of peace.

Physicist Leroy Dubeck doesn't think such questions are far-fetched. In fact, the Temple University professor has authored a curriculum that draws on the science fiction films of the 1950s, 60s, and 70s to stimulate serious discussion about science. His coauthors are biologist Suzanne Moshier and English professor Judith Boss, both at the University of Nebraska at Omaha.

"Science fiction films can help reverse the negative attitudes that many students have toward real science by moving them from familiar experiences they enjoy to unfamiliar experiences they expect to be dull and difficult—like learning physics, astronomy, biology, and chemistry," Dubeck says.

Under National Science Foundation grants, Dubeck developed his curriculum, began testing it with students, and finally trained teachers in using films to enhance science courses. In a preliminary study of nearly 400 students in the Philadelphia area, students reported being more positive and less fearful about science as a subject, and seemed to have a better understanding of scientific processes. Recent international studies have shown that American students place dead last in their comprehension of science and math concepts.

In *Science in Cinema: Teaching Science Fact Through Science Fiction Films* (Teachers College Press), the authors set forth lesson plans to help teachers discuss scientific principles used (or abused) in films. In the example above, Klaatu said he traveled 250 million miles in 5 months. Since there are no inhabited planets in our solar system, he must have come from another system. But the nearest star, Alpha Centauri, is about 4.3 light-years away. Thus, there can be no inhabited planet 250 million miles away from Earth.

Similarly, the 1950 film "Destination Moon," about America's first trip to its moon, can be the starting point for a discussion of gravitation and escape velocity. "The Andromeda Strain," a 1970 thriller about a deadly microbe from outer space, can spark discussion of the origin of life, DNA, and AIDS.

Getting kids more interested in science may be a step in getting more science majors, Dubeck says.

Museum of Modern Art/Film Stills Archive

Gort, Klaatu (and Friend). *Helping kids learn science?*

Paying Your Dues

If you recently filed your income tax returns, and accurately and honestly reported your full income, you're in the majority—but just barely. About half of all taxpayers understate their income, through errors, ignorance, or cheating. The Internal Revenue Service estimates that for 1986, the tax gap was some $70 billion, or about 40% of the federal deficit.

The National Research Council recently issued a two-volume report, "Taxpayer Compliance," that summarizes a wealth of studies in the field. Some of the findings:

- Men are more likely than women, and younger people more likely than older people, to underreport their income. But no one's sure just why.
- Not all noncompliance is in the taxpayer's favor. Of those who incorrectly report their income, about 12% overreport. About one-third of taxpayers don't claim all the subtractions they're entitled to.
- Noncompliance typically involves fairly small amounts, almost always less than $1000.
- Noncompliers say they find the tax regulations and forms too confusing (surprise!).

The report acknowledges that much of the research to date is less than compelling because tax studies are hard to design and often rely on self-reporting. Future studies should have more rigorous design, the panel says.

■ GREGORY BYRNE