

Adults score low in science literacy

Most adults in the United States keep abreast of scientific developments through news accounts. Yet only about 23 percent of those adults understand the nature of scientific inquiry well enough to make informed judgments about those science stories, finds a new survey performed for the National Science Foundation. Similarly, though most of the adults polled said they were interested in the environment and pollution, only about one in nine could offer even "a minimally correct scientific explanation" of environmental concepts such as global warming.

In the 12th issue of NSF's biennial *SCIENCE & ENGINEERING INDICATORS*, published last week, Jon D. Miller and Linda Pifer of the Chicago Academy of Sciences unveil their updated survey on science literacy in the United States. The 1995 data show that about 70 percent of adults think science is valuable, continuing a trend more than 2 decades long (see p. 360). At the same time, Miller points out, understanding of particular concepts—or even of how science is performed—remains low.

For instance, he and Pifer found that fewer than 10 percent of adults can describe a molecule beyond noting that it's small. Only 20 percent can even minimally define DNA, and slightly fewer than half know that Earth rotates around the sun once a year.

Although almost one-quarter could explain correctly how chlorofluorocarbons were believed to contribute to the thinning of stratospheric ozone, only about half of these adults could describe reasonably well where in the atmosphere this thinning is taking place. Moreover, two-thirds were unable to explain the potential health risks of ozone thinning. Even fewer knew how acid rain forms (5 percent) and why it is of concern (2 percent), although most adults said they "oppose" acid rain.

Among the new study's most troubling findings, Miller believes, is a lack of understanding about how science is performed, as exemplified by answers to a pair of questions about a hypothetical experiment testing a new medicine to combat high blood pressure. Question one asked whether it would make better sense to administer the drug to 1,000 individuals or to give the drug to half of them and then compare that group's responses to the reactions of those who got no drug. The second question asked the respondents why they had made their particular choice.

One-third picked the first option, most reasoning that the more people tested, the more reliable the test's findings. Among those who selected the second option—the one considered correct by the scientists—fully 30 percent reasoned that experimenting on only 500 was better "because if the drug kills people, it only kills half as many." Clearly, Miller says, these people do not understand the role and value of a control group.

U.S. adults are no more illiterate about science than their peers in Japan, Canada, and the European Union, Miller says. His new data from 15 nations show that what distinguishes U.S. adults is that they "are the most optimistic about the outcomes of science and have the least reservations about science."

Truly an end to smallpox

Sixteen years ago, the World Health Organization announced that smallpox had been eradicated. But it wasn't until last week that representatives of WHO's 190 member nations, meeting in Geneva, unanimously resolved to destroy all supplies of smallpox virus—on June 30, 1999.

Some 600 vials of the virulent germs had been stockpiled with the Centers for Disease Control and Prevention in Atlanta and the Russian State Research Center of Virology and Biotechnology in Koltsovo for use by researchers. However, by December 1994, geneticists had fully characterized the microbe's genetic code, so WHO's science advisers argued that little reason existed to hold the virus any longer.

The research centers plan to maintain cloned fragments of the virus' genetic material, which are not infectious, for further analyses. WHO also intends to keep 500,000 doses of smallpox vaccine and a relatively harmless virus related to smallpox that is used to produce that vaccine.

Fishing: Out of control?

As Earth's appetite for seafood grows, fueled by rapid human population growth, fish have been feeling the pinch. First, Pacific anchovy fisheries collapsed. Then, cod and other Atlantic fisheries declined from overfishing (SN: 12/16/95, p. 415). Through it all, trawling rates have remained high.

Indeed, 1994, the most recent year for which data are available, saw finfish harvests hit a record high—109 million tons, according to *Vital Signs 1996*, an annual survey of natural resource trends by the Washington, D.C.-based Worldwatch Institute. Much of this 7 percent increase over the previous year came from aquaculture and stepped-up trawling by China, Peru, and Chile, which together netted almost 40 percent of the world's fish catch.

These harvests are not sustainable, however, the Worldwatch report finds. The same conclusion was reached in a more detailed analysis of the stress on global fisheries by Meryl Williams, Director General of the International Center for Living Aquatic Resources Management in Manila, the Philippines.

Fish harvests now far outweigh meat production from cattle, sheep, pigs, or poultry. Indeed, about 1 billion people rely on fish—the fifth largest agricultural commodity—as their main source of animal protein, Williams notes in a report prepared for the International Food Policy Research Institute in Washington, D.C.

Out of 200 fish stocks being tapped globally, however, one-quarter are overfished and 38 percent more are fully exploited. With demand expected to exceed supply well into the next century, Williams concludes that "Fish is unlikely to ever return to being the 'poor man's protein.'"

Indeed, she argues, maintaining anything near current production levels will probably require sharp increases in fish farming and large investments in research to understand how to manage both farmed and overexploited wild stocks. Moreover, fish scientists must "break their isolation" from fishers not only to improve their understanding of the cultures and economics driving the decline of fisheries, she says, but also to "have a greater chance of getting their messages across" to those who will be most directly affected.

Hackers crack Defense computers

Increasingly, sensitive Department of Defense computer files are being read and, in many cases, altered or destroyed by unauthorized individuals. A new analysis from the General Accounting Office, a congressional agency, reports that 65 percent of the estimated 250,000 attacks on DOD computer files last year proved successful.

"At a minimum, these attacks are a multimillion-dollar nuisance," GAO finds. At worst, they compromise security. Computer hackers have occasionally seized control of entire systems that support logistics, financial data, or weapons research and development. Moreover, GAO says, the potential exists for foreign terrorists to disrupt U.S. defense operations by disabling the collection and communication of intelligence data or the controls for communicating military commands.

Although DOD has responded to the individual computer attacks, which have been doubling in frequency annually, the agency has no uniform policy for assessing risks, protecting its systems (which include more than 2.1 million computers and 100 long-distance networks), or quantifying damage, the GAO finds.