Banned pollutant's legacy: Lower IQs

One by-product of the United States' industrial culture is the ubiquitous contamination of the environment—and our bodies—with polychlorinated biphenyls (PCBs). Exposure to these persistent, now-banned chemicals begins before birth, as a woman's blood delivers to the fetus some of the PCBs stored in her fat. This legacy, even when not unusually large, can impair brain development.

By fifth grade, a new study finds, its effects can show up as diminished IQs.

Joseph L. Jacobson and Sandra W. Jacobson of Wayne State University in Detroit have followed several hundred Michigan children born in the early 1980s. They stratified the children into exposure groups, using PCBs in the mothers' breast milk as a gauge of how much of the pollutant the mothers carried.

Once used primarily as insulators in electrical transformers, PCBs now taint most soils and water. Much of the pollutant in the most heavily exposed Michigan children traced to their mothers' having eaten large quantities of Great Lakes fish—notorious for their PCB contamination.

Earlier studies had shown that children with the highest prenatal PCB exposures exhibited developmental delays, starting in infancy. Though breast-feeding sometimes added substantially to an infant's store of PCBs, only prenatal exposures appeared to affect a young child's development—especially his or her short-term memory.

The Jacobsons now describe IQ and achievement test results for 212 Michigan children. While there was no "gross intellectual impairment," they report in the Sept. 12 NEW ENGLAND JOURNAL OF MEDICINE, the average IQ was 6.2 points lower in the 30 11-year-olds who had the highest prenatal PCB exposures (based on at least 1.25 micrograms per gram of fat in their mothers' breast milk) than in children with smaller exposures.

PCBs appear to exert their greatest effect on short-term memory, planning skills, and distractibility, says Joseph Jacobson. Although affected kids "are still in the normal range," he notes, high exposures "are just pulling a lot of them into the bottom of the normal range." In word comprehension, for example, the highly exposed children lagged 6 months behind the other group.

Most of the children are middle-class, says Joseph Jacobson. "I thought that once they reached a structured school environment, whatever minor [PCB-induced] handicaps they had would be overcome. So I was quite surprised to find that, if anything, the effects were stronger and clearer at age 11 than they had been at age 4."

While unexpected, the findings are "plausible," judging by recent data from children born to victims of PCB poisoning (SN: 11/11/95, p. 310), observes Walter J. Rogan of the National Institute of Environmental Health Sciences in Research Triangle Park, N.C. He notes that even the highest exposures in the Michigan children could occur anywhere in the United States. "The notion of a background substance that everybody's exposed to doing that kind of detectable damage is disturbing." *— J. Raloff*

New chemical filters block laser bursts

A laser can be both an invaluable tool and an occupational hazard. A stray flash of light reflected off a shiny surface can cause permanent damage to inadequately protected eyes.

People who work with lasers may soon benefit from the light-blocking properties of a newly tested molecule. Dispersed in plastic, the molecule forms a filter that stays transparent at low light levels but turns dark when hit by pulses of high-intensity light. Goggles with this optical limiting property could protect eyes against laser light damage without compromising normal visibility.

Like ordinary sunglasses, the goggles currently in use don't adjust the strength of the blocking power to the light's intensity. Therefore, those who work with lasers need either "a whole battery of goggles or [lasers with] cumbersome and expensive security features," such as automatic beam cutoff systems, says Joseph W. Perry, a physical chemist at the California Institute of Technology in Pasadena. "No one can be happy with what's out there now."

The compound described by Perry and his colleagues in the Sept. 13 SCIENCE is a phthalocyanine complex, an organic molecule with an indium atom at its center. It absorbs light flashes over a range of 150 nanometers in the green part of the spectrum, with peak absorption at 500 to 530 nanometers.

In their prototype filter, the researchers increased the concentration of the molecule from front to back of the plastic's thickness. That arrangement maximizes the material's light-blocking capability and, more important, prevents heat damage to the polymer, says Alan Kost, a physicist at Hughes Research Laboratories in Malibu, Calif. Placing all the molecules in one layer could cause local heating and bubble formation in the plastic, he explains.

The prototype system lets through 10 times more laser light than would be desirable for full eye protection. Even so, it improves upon the next best optical limiter, buckyballs in solution (SN: 03/28/92, p. 197), by a factor of 64. "It's better than anything else I've seen in a solid host," says Kost, one of the researchers who did the buckyball work. "It's tremendously encouraging."

Perry and his colleagues have pursued their research by synthesizing red instead of green complexes, which extends their usefulness to a larger area of the spectrum. "We've made the molecules about as good as you can make them," he says, but the overall design of the filter still needs to be improved. He suggests that combining different blocking molecules in one plastic might leap that hurdle. *— C. Wu*

The trouble with condoms

In the mid-1980s, physicians began noticing high numbers of urinary tract infections among women who had been using diaphragms. When repeated refittings didn't solve the problem, researchers eventually linked the trend to a popular spermicide applied to the contraceptive device.

Scientists have now determined that using condoms with nonoxynol-9 more often than once a week increases by more than three times a woman's odds of getting a urinary tract infection, according to a study in the Sept. 1 AMERICAN JOURNAL OF EPIDEMIOLOGY.

"The problem is that nonoxynol-9 is a fairly nonspecific killer," says study leader Stephan Fihn of the University of Washington in Seattle.

Besides fighting harmful germs such as herpesvirus and HIV, nonoxynol-9 wipes out helpful bateria such as lactobacilli, which moderate the acidity of a woman's vagina. Killing these microbes clears the way for *Escherichia coli,* an intestinal bacterium undeterred by high acidity. *E. coli* marches up the woman's urethra and into the bladder, where it causes an infection.

For the average woman, the increased disease protection afforded by the spermicide coating outweighs the risks, says Fihn. He counsels women with a history of infections to consider using a different contraceptive method, such as uncoated condoms along with birth control pills.

"Urinary tract infections are an enormous problem," says Betsy Foxman of the University of Michigan in Ann Arbor. According to her research, 7 million cases occur every year in the United States. By age 30, half of U.S. women have suffered at least one infection.

Researchers hope that more specifically targeted coatings on condoms in the future will solve the problem presented by nonoxynol-9 today.

— D. Vergano