



Today the conservation movement finds itself turning back to ancient Indian land ideas, to the Indian understanding that we are not outside of nature, but a part of it.

Stuart L. Udall

The Quiet Crisis, 1963

PHthalATES

Baby Ills from Beauty Aids?

Last November, pregnant women had a reason to be glad they could no longer reach their toenails. *Beauty Secrets*, a report published by the Washington, D.C.-based Environmental Working Group (EWG), warned that women of reproductive age should avoid cosmetics containing dibutyl phthalate (DBP), a compound commonly used in nail polish and other beauty products. The month prior, in the October 2000 issue of *EHP*, scientists from the Centers for Disease Control and Prevention (CDC) and the National Toxicology Program (NTP) published results of tests on urine specimens collected through the Third National Health and Nutrition Examination Survey. The tests revealed that some of the highest concentrations of the DBP metabolite monobutyl phthalate turned up in women of child-bearing age.

The current DBP reference dose, set by the U.S. Environmental Protection Agency, is 100 micrograms per kilogram body weight per day. DBP has not been connected to birth defects in humans, but studies with rats have shown this phthalate to be antiandrogenic, suppressing hormones involved in male sexual development. Although male rats appear more sensitive to the effects of DBP, higher doses can induce effects such as high liver and kidney weights, hepatic lesions, and neural tube defects in females as well.

For years, scientists assumed that most human DBP exposure came primarily through the minute quantities found in the food chain. The CDC/NTP team, led by CDC researcher John Brock, now adds cosmetics as another possible source of exposure. DBP metabolite concentrations in the 289 adults studied suggest people are exposed frequently because the phthalate ester does not bioaccumulate and has a half-life of less than 12 hours, says Brock.

Added to a variety of consumer products since the 1930s, DBP is used in cosmetics to reduce brittleness and cracking and as a "penetration enhancer" and emollient. But *Beauty Secrets* coauthor Jane Houlihan says neither women's exposure to DBP via cosmetics nor the human health effects of DBP exposure have ever been measured. Except for chemicals added directly to food, there is no legal requirement for health and safety testing or human exposure monitoring for any chemical in commerce, states the report, which adds, "The same chemicals, ironically, are often tightly regulated as pollutants."

The authors of *Beauty Secrets* read cosmetic labels both online and in drug stores. They found that ingredients were often listed in tiny print, inside the packaging, or not at all, despite Food and Drug Administration requirements. In addition, says Houlihan, manufacturers need not list fragrance ingredients (which may include DBP) or any chemical mixture considered to be a trade secret. This leaves consumers with "no practical way

to choose products that are phthalate-free," says the report, which lists 37 DBP-containing and 4 DBP-free nail products.

The report suggests that phthalates should be considered as potential contributors to human health effects including hypospadias (misplacement of the urethral opening in the penis) and cryptorchidism (undescended testes). But studies on these defects have produced conflicting results, with some suggesting there has been no significant increase in hypospadias. Moreover, any increases in hypospadias may be due to other factors, such as the increased age at which women in the United States are having children.

Scientists—including those from the EWG—admit that connecting human birth defects to DBP is speculative. "There's a big difference between what humans are exposed to and what produces an effect in animals," says researcher Paul M. D. Foster of the Chemical Industry Institute of Toxicology, who has studied the teratogenic effects of DBP on rats.

Representatives of the cosmetics industry claim the amount of DBP in their products—about 5% by weight in nail polish, according to Houlihan—is too small to endanger users. "Dose makes the poison," says Gerald McEwen, vice president of science for the Cosmetic, Toiletry, and Fragrance Association, a trade group based in Washington, D.C. "You can not have enough exposure to DBP from cosmetics to cause birth defects."

In March 2001, the CDC published the *National Report on Human Exposure to Environmental Chemicals*, which discusses monobutyl phthalate, among other chemicals [see "CDC Unveils Body Burden," this issue]. The results have not yet been broken down by age, so Brock can't say if they match his team's finding of high levels in reproductive-age women. He and others at the CDC are conducting a new study to identify the prime sources of DBP exposure. Michael Shelby, director of the NTP Center for the Evaluation of Risks to Human Reproduction and a coauthor of the *EHP* paper, expects the results to help consumers make their own decisions about using products with DBP. "We need to understand where those high exposures are coming from and why women of childbearing age have higher exposures," he says. "The public deserves some balanced information."

—Cynthia Washam



A price for vanity? Researchers are beginning to ask whether nail polish and other cosmetics are a possible source of phthalate exposure—and thus a risk—to unborn children.

Corbis

CHEMICAL EXPOSURES

CDC Unveils Body Burden

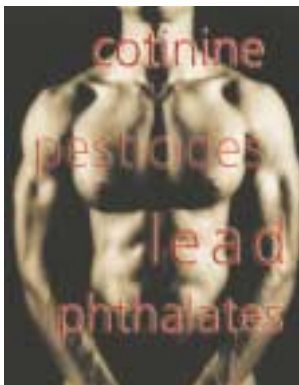
On 21 March 2001 the Centers for Disease Control and Prevention (CDC) released its pioneering *National Report on Human Exposure to Environmental Chemicals*, unveiling the first available benchmarks for a few of the thousands of chemicals that the general population is exposed to. Limited data suggest that certain public health initiatives (such as campaigns to discourage smoking and educate people on the dangers of lead) are working, but more research is needed to understand any health implications.

The report is based on blood and urine samples taken from about 3,800 volunteers in 12 U.S. locations, people who are representative of the U.S.

population and who reported no unusual toxic exposures. Researchers measured 27 potentially toxic substances. The results for each substance give researchers, public health officials, and regulatory agencies their first hard data on the ranges of typical contaminant concentrations in people. They do not provide any information on potential health risks, but some of the research needed to fill in those large gaps is already under way.

Of the 27 substances, only 3—cadmium, lead, and cotinine (a metabolite of nicotine)—had been tracked historically. Cadmium body burden, or the amount of the substance in the body, did not change significantly over time. However, data on cotinine and lead showed drops in the body burdens of each. Using data from earlier CDC studies, researchers found a 75% drop in nonsmokers' cotinine body burden over the past decade and a 25% drop in lead concentrations in children aged 1–5 since the early 1990s. The decline in cotinine may be due to regulations restricting or prohibiting smoking, while the decline in lead may be due to bans on lead in products such as gasoline and public health campaigns to reduce lead exposure from sources such as paint in older houses.

Similar analysis isn't possible with the other 24 substances tested, though, because there are no comparable historical data. Those substances include 12 other metals, such as cobalt, mercury, and uranium; 6 organophosphate pesticide metabolites from 28 pesticides; and 7 phthalate metabolites, found in products such as fragrances, hand lotions, industrial solvents, and flexible plastic products.



In analyzing the phthalate results, researchers saw that the highest concentrations came not from the most commonly available phthalates but from lower-production-volume substances such as di-ethyl phthalate, used in toiletries such as bar soaps, perfumes, and shampoos. Scientists suspect that direct skin contact with these products may increase body burden; more research is needed to confirm this theory. The health risks of these phthalate

metabolite body burdens are poorly understood.

Another category of contaminants with poorly understood health risks is organophosphate pesticide metabolites. The fact that these pesticides show up in people at all concerns Daniel Swartz, executive director of the Children's Environmental Health Network. Because detectable concentrations of the metabolites are relatively short-lived and because they were found in nearly every-

one, that means most of the people had been exposed recently, and therefore a broad spectrum of the population is being exposed frequently. Swartz is pressing for more research into the health implications of such exposures. U.S. agencies such as the NIEHS, the Agency for Toxic Substances and Disease Registry, and the Environmental Protection Agency, along with their international counterparts, already are conducting or sponsoring more than 100 studies on pesticides and other substances tracked in the report.

The CDC will continue this study each year as part of its National Health and Nutrition Examination Survey. New volunteers will be tested yearly, and some 25 substances will be added annually until there are about 100 exposure agents in the mix. As the agency accumulates information, it will eventually create a large enough database to effectively break out results by age, sex, race, ethnicity, education level, and other traits. Other countries may soon undertake similar studies.

While much work remains, CDC officials are glad to have their first benchmark data. "In the past, we've had good information on chemicals in the air, in water, and in food," said Richard Jackson, director of the CDC's National Center for Environmental Health, on the day of the report's release. "[But] we've had very limited data on chemicals in people. I believe this is a major step forward in assessing exposure of the U.S. population to environmental chemicals. Actually, it could be revolutionary in terms of environmental health in the United States." —Bob Weinhold

EPA Rules Clean Air

On 28 February 2001 the U.S. Supreme Court ruled in favor of the EPA in a challenge brought against the agency by transport and business groups. The parties claimed the agency was misinterpreting the Clean Air Act in ways that allowed itself unchecked powers in setting air pollution regulations. The claims were made in 1997 after the EPA established more stringent smog, ozone, and particulate standards.

EPA administrator Christie Whitman applauded the verdict: "The Supreme Court today issued a solid endorsement of EPA's efforts to protect the health of millions of Americans from the dangers of air pollution and affirmed our constitutional authority to set these kinds of health protection standards in the future." Though siding with the EPA, the court said the agency should consider the costs associated with implementing new standards.



Too Many Cars in Kathmandu

Nepal's Supreme Court has ordered the country's government to justify an agreement to allow manufacturer—rather than government—certification that motor vehicles imported from India comply with Nepali antipollution regulations. Environmentalists are concerned the agreement will make Nepal a dumping ground for older, more polluting vehicles, and say that the agreement violates the Nepal Vehicular Emission Standard requiring all vehicles entering Nepal to bear specific approval certificates from the government of their country of manufacture.

Pollution studies in the Kathmandu Valley have found that air pollution there exceeds World Health Organization permissible limits. According to Nepal's Department of Transport Management, over 60% of the country's registered vehicles operate in that area.

Seeing the Zeolite

University of Maine chemists have developed a promising method for reducing pesticides in water. Their process combines natural light and the mineral zeolite to accelerate the breakdown of three pesticides—malathion, carbofuran, and carbaryl—35, 120, and 164 times faster, respectively, than a process using only natural light. Zeolite is used in cat litter, aquarium filters, and ion exchange systems, as well as for treating liquid nuclear waste.

Malathion is widely used to control mosquitoes and has been linked to possible cancer risks. Carbofuran exposure is associated with respiratory effects. Carbaryl is classified by the World Health Organization as moderately hazardous.

NOISE POLLUTION

EC Says Shhh!

Nearly 80 million people—20% of the population of the European Union (EU)—are exposed to noise levels high enough to cause adverse effects including annoyance and sleep disturbance. Another 170 million live in areas where noise can cause “serious annoyance” during the day. In terms of costs such as lowered property market value, abatement measures, avoidance, prevention, medical care, and production losses, the annual cost of noise pollution has been estimated by the European Commission to be as high as €38 billion (or US\$34 million). A review article by Dutch scientists Willy Passchier-Vermeer and Wim F. Passchier, published in the March 2000 issue of *EHP Supplements*, notes that “there is sufficient scientific evidence that noise exposure can induce hearing impairment, hypertension and ischemic heart disease, annoyance, sleep disturbance, and decreased school performance.” Action is being taken locally in some EU member states to remedy these problems, but noise is still a pressing concern.

Last summer, the European Commission, which is responsible for proposing EU

legislation, took matters in hand. On 26 July 2000 the European Parliament and Council were presented with a draft directive to guide the development of a more cohesive, effective approach to governing noise pollution in EU countries.

The directive stems from a 1996 green paper by the European Commission outlining the European environmental noise situation. The directive defines environmental noise as sound that is generated by human activity (for example, traffic and construction noise) and that is perceived in the domestic environment (for example, at home and in schools). The directive is aimed primarily at noise exposure around major roads, railways, and airports, and in agglomerations of 100,000 or more people. (Occupational noise is also beginning to be addressed by individual member states.)

The goal of the EU directive is to quantify and then reduce the number of people suffering from annoyance and sleep disturbance because of noise. Under the directive, noise indicators and methods for assessing environmental noise will be harmonized across the EU. This will allow the production of strategic “noise maps,” graphs used to assess how many people are affected by noise from specific anthropogenic sources. Using the noise map

data, member states must then draw up action plans to manage noise and reduce it where necessary. They may also set up limit values for various types of noise in accordance with the harmonized noise indicators.

Margot Wallström, commissioner of the EU Environment Directorate-General, said at the July 2000 presentation of the draft directive, “We need to create pressure and indeed oblige the member states to carry out action plans to reduce noise where it is considered unacceptable.” Says Passchier-Vermeer, “I consider this agreement . . . an important step forward since it will show the extent of noise exposure to aircraft, road, and rail traffic noise in a comparable way.”

Following a first reading by the European Parliament on 14 December 2000, EU environment ministers reached political agreement on a common position—that is, an accepted draft of the directive. A second reading by the European Parliament in the second half of 2001 will yield a final document. Following publication of the final directive in the *Official Journal of the European Communities*, each member state will be bound to comply by enacting national laws, regulations, and administrative provisions as it deems fit. —Susan M. Booker

WATER POLLUTION

Boston Pee Party

Millions of coffee drinkers may be providing the ultimate environmental wake-up call. So much caffeine flows into and out of people daily that it could offer the best test yet for water pollution, says a scientist in Boston, Massachusetts, who has measured the caffeine content of the city's harbor.

Sewage spills are now detected by checking for strains of fecal *Escherichia coli* bacteria, which themselves are often not harmful but suggest the possible presence of potentially dangerous pathogens such as *Salmonella* and the hepatitis B virus. But that test is slow to yield results, and it doesn't indicate whether the bacteria came from animals or humans, which could provide a clue as to whether the waste is harmful.

So the search is on for a quick and easy marker for human sewage. Robert Chen, an oceanographer in the Environmental, Coastal, and Ocean Science Department of the University of Massachusetts Boston, thinks the answer may be caffeine. It is perhaps the world's most popular psychoactive drug—about 90% of Americans consume caffeine every day in the form of coffee, tea, soft drinks, and other products. Chen says the body absorbs and metabolizes 94–99% of the caffeine consumed. While nearly all caffeine is transformed to a variety of metabolites, as much as 20% passes intact through the body and sewage filtration systems, and may reach coastal waters. “That's a small amount of the original caffeine ingested, but it makes for a huge amount of a trace molecule,” says Chen.

Chen and graduate student Ray Siegenger established the baseline caffeine component of Boston Harbor by repeatedly measuring six sites in the water using gas chromatography–mass spectrometry. This baseline caffeine concentration, which comes from treated wastewater that is pumped miles out into Massachusetts Bay, reflects the small percentage of caffeine not eliminated by sewage treatment. Anything above that level could indicate the occurrence of a sewage



Coffee clues? Scientists looking for an indicator to help detect sewage spills may find the answer in the morning brew.

spill. By taking readings at many points within a body of water and finding where the readings are highest, it may be possible to trace a spill back to its source.

Chen and his colleagues are now computing the relationship of caffeine to more harmful chemicals. For example, says Chen, for every 10 parts of caffeine found in treated water, there may be 1 part of a different substance that is, say, an endocrine disruptor. Abnormal amounts of caffeine might then indicate that higher-than-acceptable levels of the endocrine disruptor will be found in the water. “Everyone is looking for that magic single indicator of sewage,” he says.

Says Christian Daughton, chief of the Environmental Chemistry Branch of the Environmental Protection Agency (EPA) National Exposure Research Laboratory, “For the purposes of tracing sewage, in some locales there may be too much caffeine introduced to open water, both from human excretion to domestic sewage and by disposal of leftover coffee to sewage systems and via storm drains [by dumping coffee out onto the ground].” On the other hand, he says, “Caffeine may exist for just the right amount of time to serve as a signal of pollution. It is a delicate balancing act because the tracer has to survive sufficiently long to have a chance to see it, but not so long that you always see it.”

But caffeine may prove inadequate as a sole marker of human sewage, say several environmental chemists. According to a 3 July 2000 Associated Press article, studies in Puget Sound discovered caffeine everywhere in otherwise relatively clean waters, rendering the marker invalid. Susan Glassmeyer, a research chemist in the National Exposure Research Laboratory, says what is needed is a “mass fingerprint” of 10–15 compounds, a mix of pollutants including drugs, bleaching agents, surfactants, compounds produced by the human body such as coprostanol, and yes, caffeine. She and her team are developing such a test using liquid chromatography–mass spectrometry. —Renée Twombly



U.S. EPA Indian Environmental Office

Long before the first Europeans set foot in North America, the continent's indigenous nations were responsible for the health and welfare of their own people. In spite of the eventual expansion of the United States across millions of acres of formerly native-held lands, American Indian governments continue to possess self-governing powers. In fact, several U.S. environmental statutes contain provisions that allow the Environmental Protection Agency (EPA) to authorize tribal regulatory programs or that call for a substantial role for tribes.

Still, a "trust" relationship exists between the U.S. government and some 2 million Indians that is the basis for U.S. control over tribal self-governance and for a corollary duty on the part of the U.S. government to act in the best interests of indigenous peoples. Assisting some 550 American Indian governments in exercising their environmental protection powers and upholding the federal government's trust responsibility to native people is the task of the EPA's American Indian Environmental Office (AIEO), which is located online at <http://www.epa.gov/indian/>. The office is responsible for providing grants to tribal governments, offering training to tribal environmental managers, negotiating agency/tribal agreements for building tribal environmental programs, and improving communication between the agency and tribes.



Under the Programs link on the AIEO home page is information about tribal programs within the EPA's various offices—such as the Office of Air and Radiation, the Office

of Enforcement and Compliance Assurance, and the Office of Water—and information pertinent to those offices. Under the Office of Air and Radiation heading, for example, visitors can obtain a final rule on tribal authority to operate air quality programs under the Clean Air Act. Under the Office of Enforcement and Compliance Assurance heading is a link to the American Indian Lands Environmental Support Project, which tracks sources and impacts of pollutants on or near tribal lands. Similarly, under the Office of Water heading visitors can find access to tribal program information on drinking water and groundwater, including a report on Safe Drinking Water Act violations by water systems on Indian reservations.

The Policies & Initiatives link on the home page takes visitors to executive orders that mandate government-to-government relations between federal agencies and Indian tribes and that require federal agencies to accommodate Indian use of sacred sites located on public lands. This link also provides information about the tribal government policies of four recent U.S. presidents.

The Laws, Regs & Guidance link offers information about the EPA's grant programs for tribal governments. This link also gives access to final and interim rules on the eligibility of tribes for financial assistance and a final rule outlining the conditions under which tribal governments will be authorized to operate programs under the Clean Water Act, Clean Air Act, and Safe Drinking Water Act.

The AIEO home page also links to publications such as a tribal environmental and natural resource assistance handbook designed for tribal officials, who, unlike state officials, do not receive multiyear funding and must apply annually for EPA assistance. The Publications link leads, via *Working Effectively with Tribal Governments*, to an EPA training program that includes a downloadable resource guide with demographic, cultural, and historical information about American Indians and a summary of federal Indian law and the EPA Indian Program. The demographic chapter, for example, notes that as of the 1990 census, 37% of American Indians lived in tribal areas and another 23% in surrounding communities. According to the resource guide, unemployment is considerably higher for Indians than for non-Indians, and Indians are twice as likely to live in poverty than non-Indians, based on 1989 data.

At the bottom of the AIEO home page, visitors can choose Related Links to go to external sites such as those for the Tribal Association on Solid Waste & Emergency Response and the Institute for Tribal Environmental Professionals at Northern Arizona University. —Karen Breslin

Iceland Forgoes Fossil Fuels

Iceland has launched a groundbreaking plan to convert the country to nitrogen-based renewable fuels. A leader in alternative energy with 90% of its buildings heated geothermally, Iceland hopes to end its dependence on fossil fuels by 2030. Iceland now depends on imported oil for 38% of its energy needs.

The government has set up a company to develop hydrogen fuel cell technology and outlined a long-term process to convert its transportation sector to hydrogen-based fuels. Three hydrogen-powered buses should serve Reykjavik by 2002. Some \$50 million will be spent to convert the rest of the country's bus fleet by a later date, followed by conversion of all private vehicles. Also in development is a prototype methanol-powered fishing boat to replace the country's sizable fishing fleet.

Toxic Dioxins in EU Seafood

A European Union report warns that seafood there contains high levels of dioxins and similar toxicants, with carnivorous fish such as salmon and trout, both wild and farmed, being the most affected.

The highest levels were found in fish from the more polluted waters of northern Europe and the Baltic region. European fish oil and fish meal had up to 8 times the amount of dioxins of comparable products from less polluted areas such as Peru and Chile. Dioxins, which are industrial by-products, have been associated with hormone disruption and cancers.

The report follows a 1999 scare over dioxins found in animal feed in Belgium [see *EHP* 109:265–273]. European officials predict stronger regulations will be passed to limit emissions of dioxins and related chemicals.



EEA Grows Eastward

On 16 January 2001 the European Commission adopted proposals for 13 countries—Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey—to join the European Environment Agency (EEA) this year. This is seen as a first step toward European Union membership.

The EEA's first priority in these countries will be improving environmental monitoring and data collection. The countries will be bound by EEA regulations and have equal rights to provide staff to the agency, compete for research contracts, and participate in EEA environmental topic centers. The agency will assist in implementing European environmental laws. The countries may also participate in the EEA management board, but voting rights are delayed until full European Union membership is attained.

