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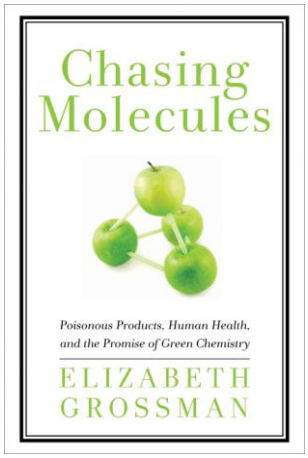

PRESS RELEASE

Chasing Molecules

Poisonous Products, Human Health, and the Promise of Green Chemistry

By Elizabeth Grossman

Washington, *DC* (September 2009) — Every day we hear more about toxics in our food and in the products we use on our bodies and in our homes. What we don't hear about is the cutting edge, scientific revolution that is working to create new materials that are safe for both people and our planet.

Elizabeth Grossman, acclaimed investigative journalist and author of ***Chasing Molecules: Poisonous Products, Human Health, and the Promise of Green Chemistry*** (Island Press, publication date: September 30, 2009), envisions a world free of these hazardous chemicals and tells the story of the scientists paving the way.

Thousands of synthetic chemicals are used to make everything from baby bottles to cookware, cosmetics, electronics, and sunscreen. Most have never been fully tested for safety. Yet many are known to interfere with hormones responsible for reproductive, metabolic, cardiac, neurological, and immune system health. There is now substantial evidence that environmental pollutants – among them synthetic chemicals emanating from consumer products – have a profound effect on the way our bodies function. Such chemicals are being linked to obesity, diabetes, asthma, and other chronic diseases.

So how do chemicals in sippy cups and kitchen cleaner end up contaminating ecosystems half a world away? How do they affect the health of newborns and their yet undreamed of children? Many are known endocrine disruptors. Many can travel so far in the air and water that scientists have consistently found these contaminants in Arctic wildlife. And many can accumulate in fat tissue, turning up in fish, seals, and whales, and in supermarket foods like cheese, meat, and milk.

Until very recently, we didn't know how these chemicals were affecting us, let alone how to design alternatives. Now, with greater understanding of the problem and rapid advances in

science, there is a burgeoning interest in creating environmentally benign, nontoxic products. Green chemistry is on the verge of becoming an industrial reality. "Benign by design" is its rallying cry, and it offers unprecedented benefits for consumers and the corporate bottom line.

Grossman has a knack for storytelling and a deep commitment to the facts. Her last endeavor, *High Tech Trash*, won high praise from *The Chicago Tribune*: "We depend on writers like ... Grossman ... to shake us awake, dispel the fever dream of consumerism and reveal the true cost of our love for technology." Much as *High Tech Trash* changed how we look at electronics, ***Chasing Molecules*** will alter our perception of everyday products. And it will show the way to a future in which safe chemicals are the norm rather than the exception.

"The threat of toxic chemicals to our health and environment is one we simply can't ignore," says Charles Savitt, president and publisher of Island Press. "Elizabeth Grossman's ***Chasing Molecules*** offers a way forward that not only illustrates the impacts, but provides the solutions."

Elizabeth Grossman is the author of *High Tech Trash: Digital Devices, Hidden Toxics, and Human Health*, *Watershed: The Undamming of America*, and *Adventuring Along the Lewis and Clark Trail*. Her writing has appeared in *Mother Jones, The Nation, Salon, The Washington Post*, and other publications. She lives in Portland, Oregon.

Chasing Molecules: Poisonous Products, Human Health, and the Promise of Green Chemistry
An Island Press Hardcover
Publication Date: September 30, 2009
ISBN: 978-159726-370-2/ Pages: 246/ Price: $ 26.96
Available at www.chasingmolecules.org

Founded in 1984, Island Press works to stimulate, shape, and communicate the information that is essential for solving environmental problems. Today, with more than 800 titles and some 40 new releases each year, it is the nation's leading publisher of books on environmental issues. But Island Press does more than publish books. It advances environmental science by nurturing the exchange of ideas across disciplines and sectors, and by helping to create a multidisciplinary literature on environmental problems and solutions. The knowledge created is spread far beyond the range of a limited marketplace through sophisticated communications initiatives that reach journalists, academics, policymakers, practitioners and the general public. Through these efforts, Island Press is driving change by moving ideas from the printed page to public discourse and practice. Island Press's emphasis is, and will continue to be, on transforming objective information into understanding and action. For more information and further updates be sure to check out our blogs and podcasts at www.islandpress.org.

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❖ *Plastic food storage containers:* **A huge number of plastic food and beverage containers, including baby bottles, are made from plastic that contains bisphenol A, or BPA. BPA has been linked to the epidemic of diabetes and obesity sweeping the industrialized world, and as an endocrine disruptor, it can also affect the ability of future generations to have children.**

The solution: The simplest solution is to use another material, something other than polycarbonate plastics based on bisphenol A. The challenge is to find alternatives that perform comparably without using materials that damage biological systems. For some tasks, glass, ceramics, and non-reactive metals work well. But when lightweight, shatterproof, and moldable materials are required, the challenge is greater. This is where green chemistry comes in. Designers of new materials examine how a substance behaves as it's being created, to make sure it will be environmentally benign throughout every stage of its life and however it's used.

When I put this question to scientists investigating health impacts of BPA, they recommended avoiding use of polycarbonate or resins (like those that line food and drink cans) when pregnant, nursing, or feeding young children – life stages most vulnerable to such chemical exposures. They also recommended avoiding use of BPA products with hot foods or in ovens or microwaves as heat typically causes the plastics to break down and release BPA. No need to panic, they all said, but based on current knowledge, you might want to make some strategic choices.

❖ *Nonstick pans:* **A nonstick coating makes cooking and cleanup easier, but some of that cookware contains perfluorinated compounds, synthetic chemicals that have been linked to impaired liver and thyroid function, endocrine disruption, reproductive and immune system problems, and cancer.**

The solution: If you're concerned about personal exposure, again, the simplest solution is to avoid the material—in this case, Teflon

and comparable coatings. The trick is that the market is virtually flooded in nonstick cookware products that claim to be "eco-friendly" and nontoxic. However, the fact is that many of these products either use coatings made of yet a new generation of perfluorinated compounds (not Teflon by name but similar in chemical composition and behavior), or coatings about which very little, if anything, is known. Again, this is where green chemistry comes in. Rather than base chemical safety regulations on lists of banned substances – created with the assumption that anything not on the list is safe – green chemistry considers safety on the basis of how a material behaves. If it is environmentally persistent, builds up in fat tissue, and disrupts healthy cell function, a material would not be considered safe, no matter what it's called.

Personally, on the frying pan and cookware front, I've chosen to avoid all nonstick coatings and use a little vegetable oil or a salt rub instead.

❖ *Sunscreen*: **We slather our skin with sunscreen to block the rays of the sun, but what is in it? Some contain new nanomaterials, particles so small that they can permeate our skin and enter the bloodstream and organ tissue. So while they work well in pharmaceuticals, nanoparticles that enter the body unintentionally have the potential for numerous adverse effects.**

The solution: You may want to err on the side of caution and use a product with readily identifiable contents, one that doesn't contain materials whose behavior has yet to be determined – particularly nanomaterials, substances so tiny that they behave utterly unlike their conventionally or even micro-sized counterparts. While nanomaterials offer great promise in terms of very specific applications – targeted drug delivery, lightweight performance materials for aircraft, or resource efficient process chemicals for high tech and pharmaceutical products, for example – they are so new and their properties as yet so unexplored that there may be reason to be cautious about using them in less controlled general applications.

Nanomaterials also make a very good argument for green chemistry, particularly because the science is so new. Here is an opportunity to ask questions about brand new materials as they are being created, before they are launched into commercial production and consumer products, rather than after the fact when they have dispersed into the environment. Such efforts are actually underway, although at the same time nanomaterials are already on the market in hundreds of everyday products, from underwear to cosmetics and sports gear.

❖ *Couches and carpets*: **Brominated flame retardants, some known as PBDEs or polybrominated diphenyl ethers, are used in upholstery foam, furniture cushions, plastics used in electronic appliances, and many other products. The problem is that they detach and travel with air, water, and dust. They are easily absorbed by our bodies into fat tissue, where they can interfere with endocrine hormone function, and cause reproductive, neurological, and immune system problems.**

The solution: This is an example of where green chemistry and green engineering and product design can come together to solve a problem. If the goal is to make sure upholstery foams, carpet

backing, and furniture textiles meet fire-resistance standards, both the basic materials and what's being added to make them flame-proof need to be considered. Over the past couple of decades, we've simply moved from one brominated flame retardant to another, banning or abandoning ones that have adverse health and environmental impacts and replacing them with yet another brominated flame retardant, that in time has also turned out to be hazardous. With the help of the questions green chemistry poses – is the substance persistent in the environment; will it build up in fat; is it an endocrine disruptor; etc. – we need to both design alternative ways of adding flame resistance to textiles, while at the same time looking at new foams that may be inherently more fireproof.

❖ *Plastic toys*: **Many plastic toys, including baby teething toys, bath toys, and pacifiers, contain phthalates: oily, colorless liquids that help make vinyl flexible. Phthalates are known endocrine disruptors, and many studies suggest that they are connected to male reproductive problems such as increased rates of testicular cancer, reduced sperm count, and genital abnormalities.**

The solution: First solution: Use something else. That said, it's often hard to know exactly what toys and other children's and common household products are made of. A bath toy or bib doesn't typically come with an ingredients list. And alternatives to PVC (the plastic that uses phthalates for flexibility) wire coating and piping are currently hard to find and expensive in the U.S., although they're increasingly available and affordable in Europe.

This is where both green chemistry and policy that supports the goals of green chemistry comes in. While I think we need policies that will take hazardous products off the market, we shouldn't replicate these problems with subsequent generations of synthetic chemicals. Instead, we need to craft policies that ensure truly safe replacement products and do not put the burden of proof on consumers. And we need to offer maximum health protections everywhere – not just in certain countries, states, or cities.

Where PVC is concerned, personally, I wish we had alternatives for all its applications, both to avoid exposure to phthalates and to avoid exposing factory workers to plasticizers and the materials that go into creating PVC, which are even more toxic than phthalates.

❖ *Strawberries*: **Most strawberries are grown in California in fields sprayed with methyl bromide, a fumigant that kills pests in the soil before they can attack the fruit. It is also highly dangerous to people and been linked to systemic illness and birth defects. Plus, it is one of the most powerful ozone-depleting substances on Earth. California growers continue to spray millions of pounds of methyl bromide on their fields each year. Proposed substitutes include a**

powerful greenhouse gas and a potent neurological, hormonal, and respiratory system toxic that's also a recognized carcinogen.

The solution: My personal preference is for organic produce, but it's not always available for all products. And methyl bromide, while best known for its use on strawberries and tomatoes, is used on many other crops – from nuts to plums and peaches. Substituting a carcinogen and powerful global warming gas for an ozone depleter is clearly not a solution. So again, green chemistry and related policy are needed to ensure that. we don't replace one problem with another. In this case, policy that supports new ways to grow harvestable, profitable crops should be part of the mix. Whether growing fruit or making cosmetics, electronics, or toys, we need production processes that are environmentally benign every step of the way.