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Legally Poisoned: How the Law Puts Us at Risk from Toxicants

By Carl F. Cranor

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Reviewed by: Alessandra Baldini

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Introduction

In Legally Poisoned, Cranor lays out the frightening details of chemical proliferation in our modern world. In this well-researched work, the author makes clear the extent to which we are exposed to chemical toxicants, and the danger of this exposure to our health. Cranor clearly illustrates the process by which we are "legally poisoned," as the title says: the regulatory regime of the nation is one that assumes safety in all of the thousands of chemicals we encounter daily. It is only when harmful effects are shown after the fact that the government steps in to reduce or eliminate the use of a chemical. No effort is made to protect our citizens until some portion are injured.

Nowhere to Hide

Commercial chemicals invade our everyday lives.[1] For instance, "if you are sitting on your couch as you read this, the cushions likely contain brominated fire retardants:

[1] CARL F. CRANOR, LEGALLY POISONED: HOW THE LAW PUTS US AT RISK FROM TOXICANTS, 16 (Harvard University Press, 2011).

polybrominated diphenyl ethers, or PBDEs."[2] With time, PBDEs can be found in the floor, air, red meat, chicken, electronics, and your lungs.[3] Perchlorate, another commercial chemical used in rocket fuel and fireworks, can be found in tap water, or even California Imperial Valley lettuce.[4] Perchlorates can "interfere with thyroid production, which developing children need for proper neurological growth and function."[5]

Dichlorodiphenyltrichloroethane, or DDT, is a banned sprayed pesticide used over fifty years ago.[6] Women who were alive during this spraying have a five times greater risk for breast cancer.[7] Polychlorinated biphenyls, or PCBs, are currently banned from commerce; however, they are still present in our bodies.[8] Although PCBs can be found in meat and fish, vegetarians can also be exposed if they live near chemical disposal sites.[9] People living in Northern Canada and the United States usually have lower exposure levels than those living in the lower 48 states.[10]

All of these compounds are identified toxicants that are "probable human carcinogens, substances that can adversely affect the development of children, reproductive toxicants, and neurological toxicants."[11] These compounds can be very concerning and there are few ways to impede their entry into our bodies – "some products may directly contaminate us; others invade

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[2] *Id.*
[3] CRANOR, *supra* note 1, at 16.
[4] *Id.*
[5] *Id.*
[6] *Id.*, at 16-17.
[7] *Id.* at 17.
[8] CRANOR, *supra* note 1, at 17.
[9] *Id.*
[10] *Id.*
[11] *Id.*

more insidiously during routine living, as secondary contaminants from poorly disposed products or wastes."[12]

"Exposure" is an ambiguous term that "may merely mean that a toxicant has come into 'contact' with a person's body."[13] A "body burden" is "the amount of substance that can be measured in a person's tissues or fluids by biomonitoring."[14] "Exposure," as used in this book, refers to external bodily contacts, whereas "body burden" refers to an internal exposure.[15] Typically, we are not aware of our daily exposures to contaminants; although we can be aware of "smoke, pesticide spray, air pollution, or brackish water or see mercury 'beads' on surfaces, . . . we [can]not detect harmful molecular components of the exposures."[16]

Even if we are aware of exposure, we can still become contaminated, with toxicants found in our "tissues, organs, blood, and urine."[17] However, due to increases in technology, we are now able to monitor the amounts of toxicants in our bodies through biomonitoring techniques.[18] As the Centers for Disease Control and Prevention ("CDC") indicates, "biomonitoring permits determination of people's exposure to toxic substances in the environment 'by measuring levels of chemicals that actually are in people's bodies,' as detected in blood or urine."[19] Biomonitoring allows us to know the exact measure of contamination, which allows researchers to forgo the traditional method of estimation.[20]

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[12] CRANOR, *supra* note 1, at 18.
[13] *Id.*
[14] *Id.* at 19.
[15] *See id.*
[16] *Id.*
[17] CRANOR, *supra* note 1, at 19.
[18] *Id.* at 20.
[19] CRANOR, *supra* note 1, at 20.
[20] *Id.*

With the advent of biomonitoring, scientists were also more able to determine how long a toxicant survives in our bodies.[21] Now, "scientists [] know that many of [the industrial chemicals] can be in our bodies for hours, days, weeks, years, or sometimes decades. The measure of the longevity of toxicants is their 'half-life,' the period of time it takes for one-half the amount of a substance in our bodies to leave."[22] However, even if a toxicant has a short half-life, we may be constantly exposed to it, allowing it to remain in our bodies nearly permanently.[23] Substances with longer half-lives may indicate prior exposures rather than ongoing.[24]

Biomonitoring has led scientists to believe that "our bodies contain varying levels of hundreds of industrial chemicals, many of which are known or suspected toxicants."[25] As of 2009, the CDC was able to reliably identify 212 toxicants in our bodies.[26] These toxicants were identified through the use of "exposure markers."[27] A Canadian study tested body burdens among a wide variety of geographically different Canadians.[28] Although it was a small sample, the report concludes, "[n]o matter where people live, how old they are or what they do for a living, they are contaminated with measureable levels of chemicals that can cause cancer and respiratory problems, disrupt hormones, and affect reproduction and neurological development."[29] However, older participants had higher levels of PCBs than younger ones,

[21] *Id.* at 21.
[22] *Id.*
[23] *Id.*
[24] CRANOR, *supra* note 1, at 21.
[25] *Id.*
[26] *Id.*
[27] *Id.* at 22.
[28] *Id.*
[29] CRANOR, *supra* note 1, at 22.

which likely means that exposure rates are decreasing as we create better ways to prevent PCBs in the environment.[30]

In another small study performed by the NBC program Dateline, two families were tested for individual contaminants.[31] One family was vegetarian, ate mostly organic food products, and used "natural" cleaning products; the other family was "a more typical American family … [who] ate considerable amounts of eggs, cheese, sirloin steak, turkey, and many 'convenience' foods because of their schedules," and chose cleaning products based on their effectiveness rather than toxicity.[32] "Both families were tested for seventy-six industrial chemicals in their bodies… [the first family] had forty-two, and the [second family] had forty-three."[33] However, the second family had "three times as many perfluorinated compounds" as the first family.[34] The second family's children also had "more phthalates than 76 percent of the people tested in the United States."[35] On the other hand, the first family had greater levels of bisphenol A ("BPA"), whereas the second family's BPA levels were hardly detectable; due to a greater consumption of canned foods consisting mostly of refried beans, it appears that the first family ingested BPA from the can linings.[36] Since BPA is "quickly eliminated from the body," its presence suggests continuous exposure.[37]

At any given time, we are likely contaminated by hundreds of toxicants.[38] These and other studies suggest that there is little that we can do to avoid this exposure, and eating organic

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[30] *Id.*
[31] *Id.* at 23.
[32] *Id.*
[33] *Id.*
[34] CRANOR, *supra* note 1, at 23.
[35] *Id.*
[36] CRANOR, *supra* note 1, at 23-24.
[37] *Id.* at 24.
[38] *Id.*

foods is not as effective as we may believe.[39] Apart from living in the Arctic Circle, there may be "systematic approaches" we can partake in to decrease our exposure levels.[40] For instance, the United States banned PCBs in the 1970s and the amounts of this compound have since been substantially lower.[41]

Discovering Disease, Dysfunction, and Death by Molecules

As aforementioned, industrial compounds have invaded our bodies, and we have hundreds of toxicants present on any given day.[42] However, some of these toxicants can cause harm, or even kill us "directly and quickly."[43] For instance, arsenic in high doses can kill quickly; in low doses, it will kill slowly.[44] Further, arsenic exposure during fetal development "can contribute to lung, skin, urinary, and bladder cancers long after arsenic has left a person's body."[45]

Exposure early in life to diethylstilbestrol ("DES") or DDT may increase a woman's "risk of breast cancer."[46] It has taken scientists "forty to fifty years to identify first vaginal cancer and then breast cancer in women exposed to DES in utero."[47] However, there may be difficulties in identifying sources of diseases, and it could take "years to separate normal variation in mental functioning from the acceleration of dementia in old age caused by pesticides or other neurotoxicants."[48] Studies can lead to false senses of security – for instance, "When we

[39] *Id.*
[40] *Id.*
[41] CRANOR, *supra* note 1, at 24.
[42] *Id.*
[43] CRANOR, *supra* note 1, at 47.
[44] *Id.*
[45] *Id.*
[46] *Id.*
[47] *Id.* at 48.
[48] CRANOR, *supra* note 1, at 48..

are told that 'no human studies have shown that substance X poses risks to humans,' we may feel there is nothing to worry about, yet this is hardly the whole story."[49]

For example, an international group of scientists critiqued a study by IBM, which determined whether there were cancer risks in electronics plants.[50] They stated that since the study was "too small to detect cancer risks in electronics plants," IBM cited "the negative results, not as inconclusive, but as showing safety."[51] However, "a later researcher with access to the IBM data from a legal case found elevated risks of cancer among employees."[52] Such studies that result in "no effect" claims should be heeded with caution – "not all studies are conscientiously conducted; some are designed to minimize, not to discover, or even to hide adverse outcomes."[53]

Studies may not always be in the best interest of the consumer – "companies whose products may be threatened by scientific findings have commercial incentives to demand unreasonably high degrees of certainty, multiple studies, and 'proof' of risks or harm before the public can be protected."[54] Since studies take time to design and perform, are costly, and require independent confirmation of the results, we may not be adequately protected, as "no public health protections can be implemented until appropriate studies have been conducted."[55] Cranor suggests implementing "premarket testing laws" and policies to address this issue – "research would begin earlier on products and would be publicly available to a wider community [which

[49] *Id.*
[50] *Id.*
[51] *Id.*
[52] CRANOR, *supra* note 1, at 48.
[53] *Id.* at 49.
[54] *Id.*
[55] *Id.*

would] both increase[] the chance[] of identifying hazards before exposures and provide[] other scientists data to follow up and the opportunity to possibly discover more subtle risks."[56]

Caveat Parens: A Nation at Risk from Contaminants

Within the last forty years, scientists have evolved from prior ideas regarding the safety of a fetus. Previously, "the scientific community viewed a woman's womb as a sheltered, capsule-like environment, safe from the intrusions and dangers of the outside world."[57] Due the misconception that a woman's body served as a safe-haven for a developing fetus, women continued with their regular habits: "a pre-dinner cocktail, one or two glasses of wine with dinner – because her developing child was tucked safely inside her."[58] A pregnant woman could continue to smoke, drink, and use industrial chemicals because her baby was presumably safe inside.[59] However, this safe-haven notion quickly changed during the 1960s and 1970s, when "children born to women exposed to methylmercury in fish and to the pharmaceutical thalidomide raised the early alarms."[60]

From 1953 to 1968, "a Japanese petrochemical company disposed of about twenty-seven tons of methylmercury ("MeHg") in Minimata Bay, Japan."[61] As fish were exposed and became contaminated, MeHg entered our food chain.[62] MeHg has a half-life of about seventy to eighty days; therefore, humans who ingested the contaminated fish "developed neurological problems [such as] numbness and loss of feeling, some suffered ataxia, some had tunnel vision, some went

[56] *Id.*
[57] CRANOR, *supra* note 1, at 81.
[58] *Id.*
[59] *Id.*
[60] *Id.* at 82.
[61] *Id.*
[62] CRANOR, *supra* note 1, at 83.

blind," and others became permanently disabled or died.[63] Developing children were more susceptible to this toxicant "because of the way MeHg behaves biologically" –MeHg is actively transported through the placenta to the fetus, which led to "concentrations of MeHg [] at least five times greater in the fetal brain than in the mother's blood."[64] Many of the exposed children were born with "severe cerebral palsy at a much higher rate than unexposed children … [and] psychomotor retardation, blindness, deafness, and seizures."[65]

Thalidomide was a pharmaceutical sedative that was first sold in 1958 and marketed as "a strong sedative that was also remarkably safe … a drug that was almost as powerful as a barbiturate but with no noticeable side effects."[66] However, it was later discovered that side effects existed: "peripheral neuropathy (poisoning of the nerves) which created a 'tingling sensation and a feeling of numbness or cold' that could progress to 'cramps, weakness and loss of strength."[67] While these side effects were reversible, it was later discovered that more side effects existed for pregnant women.[68] Mothers who took thalidomide during pregnancy bore children who developed "phocomelia – meaning 'seal limbs' … [or lacked the] long bones in the arms and legs, which meant that the hands and feet or just the fingers and toes of the infants sprang directly from the trunk … it was also common for the baby to be born with no bowel opening, no ear openings, and segmented intestines."[69]

Exposure to thalidomide was more dangerous "twenty to thirty-six days following conception," which is when women often began feeling the symptoms of morning sickness, and

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[63] *Id.*
[64] CRANOR, *supra* note 1, at 83.
[65] *Id.* at 84.
[66] *Id.*
[67] *Id.*
[68] *Id.* at 84-85.
[69] CRANOR, *supra* note 1, at 85.

asked for a sedative.[70] Pregnant women only needed to take the drug once for the side effects to occur.[71] Further, "[t]he disease or dysfunction rate among children born to mothers who took the drug was two hundred times the background rate of similar birth defects in nonexposed children."[72] Conservative estimates place the number of thalidomide babies in the seven to eight thousand range, with about five to seven thousand dying before birth.[73]

While thalidomide caused physical deformities at birth, methylmercury could cause less visible issues. However, both the catastrophes of methylmercury and thalidomide broke the notion that a woman's fetus was a "safe-haven" for developing fetuses.[74]

A More Prudent Approach to Toxic Invasions

With the dangers clearly presented, Cranor's work moves on to the weak regulations that currently govern the introduction of new chemicals into our environment. He moves on to suggest a number of ways in which our situation could be improved. Cranor draws from practical sources to draft his suggestions, and steers clear of any stifling regulatory burdens.

Premarket testing is the primary means to promote public safety with regards to the introduction of new chemicals.[75] As Cranor notes, pharmaceuticals, pesticides, and food additives are required to undergo testing before introduction to the market.[76] Cranor poses a reasonable question: why does this not apply to industrial and commercial chemicals?[77] The FDA dictates that new pharmaceuticals must undergo animal testing in order to provide for the

[70] CRANOR, *supra* note 1, at 85.
[71] *Id.*
[72] *Id.* at 85-86.
[73] *Id.* at 86.
[74] *Id.*
[75] CRANOR, *supra* note 1, at 178-79.
[76] *Id.* at 179.
[77] *See id.* at 178.

safety of the participants in required human trials[78] – an impressive dedication to human safety. The EPA regulates the testing of new pesticides by requiring pesticides, when used according to instructions, to pose no health risk to humans and only an acceptable risk to the environment.[79] Markedly, EPA regulations pay special attention to infants and children, a subpopulation at particular risk of complications arising from exposure to toxicants.[80]

With regards to human testing, there is legal precedent on tort actions. For instance, in 1978, there was a class-action suit for battery against researchers from the University of Chicago, "who, during 1950-1952, gave women diethylstilbestrol (DES) in a double-blind experiment as part of their prenatal care at the university's Lying-In Hospital."[81] These women were unaware that they were participating in research and did not consent to ingesting DES, which at the time was not known to be harmful but was later found to cause miscarriages.[82] As such, the district court found for the plaintiffs, stating that in a battery, "the actor must intend to cause the other, directly or indirectly, to come in contact with a foreign substance in a manner which the other will reasonably regard as offensive …Thus one need not be aware at the time of exposure to a foreign substance in order to regard it as offensive."[83] Cranor therefore analogizes, "manufacturers of industrial chemicals, who are substantially certain that their substances will come into contact with citizens in a manner that recipients could reasonably regard as offensive, could be subject to a battery action."[84]

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[78] *Id.* at 179.
[79] *Id.* at 180.
[80] *Id.*
[81] *Id.* at 182.
[82] CRANOR, *supra* note 1, at 182-83.
[83] CRANOR, *supra* note 1, at 183.
[84] *Id.*

In addition, the intentional tort of trespass is applicable to toxicants.[85] Trespass can include "the deposition of molecules and particles, including gases, particulates, and lead on property."[86] Here, Cranor illustrates trespass with a hypothetical situation, stating:

> "Suppose you dispose of some trichloroethylene (TCE) from home experiments into my hot tub without permission. TCE is a probable human carcinogen and likely neurotoxicant, but diluting small amounts in a hot tub reduces any risk of harm…You did not actually harm or even pose a risk of harm to anyone exposed to it. But your TCE invaded, or trespassed on, my hot tub and my bodily integrity without my consent or license."[87]

Cranor further illustrates trespass by chemical companies on individuals' properties, stating "[s]hould not such invasions [by chemical companies] also require permission and justification by one who would cause the foreign substance to invade, just as trespasses on chemical company property requires permission and justification?"[88]

With the legal precedent clear on the topic of exposing others to known toxicants, as well as the clarity of regulations regarding testing of new pharmaceuticals, pesticides, and food additives, there is a strong case to be made for a reform of the regulations regarding industrial chemicals.[89] Industrial chemicals are definitely analogous to pesticides.[90] Cranor makes the argument that to protect citizens from illegal trespass and battery, as well as to show an equal

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[85] *See id.* at 184.
[86] *Id.*
[87] CRANOR, *supra* note 1, at 185.
[88] *Id*. at 186 (footnote omitted).
[89] *See* CRANOR, *supra* note 1, at 187.
[90] *See id.*

concern to the public as to the test subjects, industrial chemicals should be subject to premarket testing.[91]

What Kind of World do We Want to Create?

In the book's concluding chapter, Cranor discusses where we, as a society, may proceed as we move forward in a world with evermore chemicals being introduced into our environment.[92] It is clear from the weight of the evidence in the rest of the book leading up to this point that there is only one reasonable direction to go, according to Cranor. That direction is toward premarket testing for all chemicals and potential toxicants with greater protection and respect for citizens.[93] With such scientific assessment, both of synergistic effects and risk to sensitive subpopulations, quality of life would be improved for everyone.[94] Such policies would reduce the harmful effects of negative externalities and help to reduce healthcare costs to consumers and the taxpayer.[95]

This book provides a comprehensive analysis of the ethical, legal, and regulatory issues facing the wide-scale use of untested chemicals. The weight of the data supports Cranor's well-reasoned arguments, which he uses to effectively push for increased responsibility and increased safety for all members of society.

[91] *See id.* at 192-207.
[92] *See id.*, at 208-09.
[93] *See id.* at 209.
[94] *See* CRANOR, *supra* note 1, at 218.
[95] *See* CRANOR, *supra* note 1, at 244-48.