



# Naturally Clean

The Seventh Generation  
Guide to Safe & Healthy,  
Non-Toxic Cleaning

Jeffrey Hollender  
and Geoff Davis, with  
Meika Hollender and Reed Doyle

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*Advance Praise for*

# Naturally Clean

The Greek root of the word “ecology” means “house.” Environmental issues, therefore, are essentially about how we care for our home, or the commons – the publicly owned resources, such as air, water, wildlife and fisheries – that cannot be reduced to private property. Political activism is the best way for concerned citizens to make a difference, but it’s also important for each of us to practice an environmental ethic in our everyday lives. *Naturally Clean* is an excellent guide to how we can ensure a safer home for ourselves and our families. I highly recommend this book as an outstanding collection of information for reducing our use of toxic products and protecting our nation’s water supply.

— ROBERT F. KENNEDY, JR., President, Waterkeeper Alliance

From the esteemed experts in the field comes the final word on keeping your home clean without jeopardizing your health. *Naturally Clean* by Jefferey Hollender, Geoff Davis, Meika Hollender and Reed Davis covers the history of cleaning products, their effects on humankind, and substitutes for dangerous products in a clear and readable book that would be a worthy addition to anyone’s library.

— NELL NEWMAN, President, Newman’s Own Organics

Hollender is as important to a healthy home as Trump is to great real estate or Emeril is to spicy food. With his non-alarmist approach, Hollender uses his expertise to deliver an absolute must-read for anyone who cares about creating a healthy household.

— SAMANTHA ETTUS, syndicated columnist and creator of  
*The Experts’ Guide* book series

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With *Naturally Clean*, Hollender breaks the mold, showing us all that making money and doing good are not polar opposites. If you want to keep your family and community healthier, your bank balance higher, and your medical bills lower, then read this book!

— DEVRA LEE DAVIS, PH.D., M.P.H., Director, Center for Environmental Oncology, University of Pittsburgh Cancer Institute, and Graduate School of Public Health

If you have children in your home, *Naturally Clean* is a book you should read. It gives invaluable advice about how to keep your home clean while protecting your little ones from hazardous chemicals. It is a very sensible book.

— DR. PHILIP J. LANDRIGAN, Professor and Chairman, Department of Community & Preventive Medicine; Professor of Pediatrics, Mount Sinai School of Medicine

Redefining what a clean, safe and healthy home really is, *Naturally Clean* is eye-opening and essential to anyone who cares about their own and their family's health.

— MARIA RODALE, Vice Chairman of the Board, Rodale, Inc.

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*This book is dedicated with much hope and affection to the next generation, most especially our children: Chiara, Alex, and Meika Hollender, and Genevieve Davis-Chiola. May they know a generous lifetime of play in the fields and forests of a safe and healthy world.*





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Your works have inspired us. Your knowledge has informed us. And your passionate belief in a better way has been the light by which we've found our own. Without your efforts, our own contribution to a safer world could not have been made. You are each and every one heroes in every way.





## An Important Precautionary Preface

This book is based on the Precautionary Principle, an important new environmental philosophy. Though its ideas will be familiar to anyone with a sense of self-preservation, the Precautionary Principle itself was formally created at a 1998 landmark summit conference of scientists, government officials, lawyers, labor activists, and grass-roots environmental leaders at Wingspread in Racine, Wisconsin.

At the heart of this common sense approach to present and future environmental dilemmas lies a simple statement:

*When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.*

Believe it or not, this is a revolutionary idea. That's because when it comes to environmental issues in general and chemical regulations in particular, we here in the United States have based most of our decision-making on a system that says an activity is innocent until proven guilty. In this school of regulatory thought, most activities, whether cutting down a tree or selling a certain chemical, are considered okay to do until someone can prove that they're actually not.

This legal theory has proved to be quite dangerous from a public health perspective. Instead of protecting our families from harm, the current shoot-first-and-ask-questions-later regulatory policies of both federal and local government agencies and lawmakers tend to favor commercial interests. Under this arrangement, products and activities proposed by people and companies are generally allowed to proceed unimpeded, and it's left to the public

to definitively prove that they're harmful in some way before they can be stopped. Even when that proof can be established, many times it comes too late. Whether it takes the form of a shattered ecosystem or a prematurely ended human life, the damage has often already been done.

The logic of self-preservation, on the other hand, would seem to dictate that we first prove an activity is safe before we begin it. This latter strategy, after all, is the way we run our lives. We take a certain amount of precautionary care when it comes to our homes and our families, our jobs and ourselves. This is not to say that we don't take personal risks, for indeed we sometimes must in a life well lived, but by and large we carefully pick the chances we choose to take and avoid those that might end in utter ruin.

Such is the thinking behind the Precautionary Principle. The polar opposite of our current regulatory approach, it says that when it comes to environmental issues, we should take a good long look before we leap, and err on the side of caution when making our decisions. When there is doubt about the safety of a product or an action, that product or action should be set aside until those promoting it can prove that it is harmless. That doubt need not have definitive evidence to support it, and if proof that erases this doubt cannot be provided, the product or action cannot proceed.

This is the Precautionary Principle, and it is the foundation of our book. The suggestions and ideas we've placed in these pages are precautionary in nature. In accordance with the Precautionary Principle, it is our fundamental belief that we just don't know enough about many of the chemicals and products that surround us to continue using them. Emerging evidence strongly suggests that these materials may be causing us harm. Until we know what harm is being caused by which chemicals and which chemicals are, by extension, safe, we're going to stop using all of them. We're not going to run through this mine field until we have a map. That's just simple common sense, and you'll find it throughout this book.

When we say, for example, that no conventional chemical cleaning products should be used in your home, we're not saying that every single one of these products will damage your family's health. We're saying that we don't know. Because we suspect that many of them might, we feel it's wise to err on the side of caution and keep all of them out of our lives until solid proof of each specific product's safety can be provided. The stakes are just too high and the questions just too many for us to adopt any other approach.

In the end, it's far easier and a whole lot safer to simply snuff out a match, or never even light it at all, than to extinguish the forest fire it can start. That's why we teach our children not to play with fire. The Precautionary Principle, and this book, simply seek to remind us grown-ups that the lesson still applies.



## Introduction

### *Protecting the Place Called Home*

*Ordinary household products such as cleansers, cosmetics and paints are now the Los Angeles region's second-leading source of air pollution, after auto tailpipe emissions, air quality officials say.*

— *Los Angeles Times*, March 9, 2003

*According to a report in the journal Preventive Medicine, by Kenneth R. Spaeth ... data drawn from studies sponsored by the Environmental Protection Agency "indicate that the general population is exposed to unexpectedly high levels of carcinogenic substances in their homes ... The results found that 'the highest personal exposures were 5 to 70 times the highest outdoor levels'" with some toxin levels inside the majority of homes "greater than the levels that qualify as a chemical waste site for Superfund status."*

— *New York Times*, January 16, 2001

The Swiss architect Le Corbusier once wrote that “a house is a machine for living in,” and indeed, for the typical 21st century home, his statement contains more truth than ever before. Filled with an unfathomable variety of conveniences unknown even a generation ago, the places we call home have become much more than four walls and a roof that together happily conspire to keep our sleeping heads safe from the elements. They have become complex systems with countless interconnected parts and a secret inner life that goes largely unseen by the people who live within.



The many elements that combine to create this inner life represent some of the most remarkable technological advances humanity has ever had the pleasure to experience. In stark contrast to the living conditions endured by even our recent ancestors, we have devices that keep our food perfectly cooled for weeks or frozen for months. On a cold winter's day precious heat is summoned at the touch of a button, and on a hot summer's afternoon we delightfully chill our indoor air instead. At night we need neither candle nor fireplace to banish darkness. In the morning, we awaken at the preset time of our choosing, shower clean in an instantly ready stream of fresh hot water, and emerge into our

≈ The fact is, where the majority of consumer chemical products are concerned, we really don't know what the risks are. ≈

kitchens to a waiting cup of steaming coffee automatically prepared as we donned our machine-laundered clothes. Throughout the day a vast profusion of extraordinary materials work together to simplify our lives and ensure our optimum comfort. These materials are, in turn, supported by an equally staggering number of high tech potions that might at first glance seem to be the impossible stuff of science fiction and whose real-life wizardry is in actuality no less astonishing.

Truly, we live in a world of dreams come true. And the machine we call the house plays an increasingly central role in that world. The fulfillment of these dreams, however, has not been without its price, and it's a price that is both steep and often difficult to see.

Our homes derive much of their comfort and the majority of their conveniences from hundreds if not thousands of household products that are made from and filled with exotic new substances and materials. Nowhere is this more apparent than the cleaning cupboard, where we rely on a vast collection of liquids, sprays, waxes, and powders to make our living spaces sparkle. Yet though we use and appreciate these products, their ingredients have largely been invented within our own lifetimes and marketed to the public with minimal short-term and little or no long-term safety testing. It remains to be seen if a lifetime spent among them is safe let alone good for us. These unknowns have turned modern homes into test tubes and the people living inside them into guinea pigs in a vast and uncontrolled research project.

From toilet bowl cleaners to floor polishes, we're living amidst ever increasing amounts and numbers of invisible chemical agents. What are the short- and long-term health consequences of exposure to these materials? What happens inside our bodies when we come into contact with multiple chemicals from multiple sources at the same time? What are the risks for our children? The fact is, where the majority of consumer chemical

products are concerned, we really don't know. Because no government agency requires it, the scientific research needed to answer such questions has not been performed. Instead, retailers sell these chemical products on faith, and we ourselves are doing the research as we live, breathe, and raise our families among these materials every day.

Of course, it would be absurd to claim that there have been no health and safety studies of any chemicals whatsoever. Quite the contrary, many materials have, in fact, been studied for many different potential effects. Still, this accumulated research has only assessed the safety of the proverbial tip of the iceberg.

There are an estimated 80,000 different chemical compounds now in use. As of 1995, the National Toxicology Program had tested some 400 of these for carcinogenicity, or 0.5 percent. Based on the results of these studies, researchers were able to estimate that somewhere between five to ten percent of the total number of chemicals in production might reasonably be expected to be carcinogenic. That's 4,000 to 8,000 chemicals that are likely to trigger cancer, to say nothing of the many other diseases and conditions synthetic materials are potentially capable of causing.<sup>1</sup> In the ensuing years, we've made little additional progress determining which of these many thousands of suspect compounds are cause for concern. Indeed, a May 2005 update of the Carcinogenic Potency Database, a global catalog of existing chemical carcinogenicity research at the University of California, listed just 1,485 chemicals as known carcinogens.<sup>2</sup> Clearly, there's much we don't yet know.

What little we *do* know about daily contact with toxic household materials is not reassuring. The evidence that does exist strongly suggests that exposure to many of the common products we take for granted can cause cancer, hormonal disruption, nerve and organ damage, asthma, allergies, and other health problems.

It's a disconcerting conundrum: our homes and many of the products inside them — the “machine” at the very center of our vital efforts to keep our families safe and healthy — may, in fact, be doing just the opposite. The nest we retreat to in our escape from an often dangerous world is likely one of the most hazardous places of all.

This news comes as a genuine surprise to many consumers, and it's easy to understand why. We're conditioned from birth by advertising, product labels, public relations efforts, and other influences to believe that the products we use in our homes are free of serious dangers. We're led to assume that everything we buy has been tested for safety by unbiased scientists adhering to unimpeachable standards, sold by companies that have only our best interests at heart, and carefully monitored by vigilant government agencies dedicated to protecting the public welfare at all costs. Yet upon examination, these and other beliefs don't hold up. Beneath a surface of reassuring presumptions that it seems reasonable to

make, there lies an unpleasant truth: many of the materials and technologies we rely on in the modern world are sold to us without any proven record of safety and are exposing us to dangers we can neither see nor imagine. As a result, we are living in a world increasingly awash in toxins and other hazards. And it is making us sick.

This is certainly a discomfoting idea, and it's made harder to accept by the fact that there's no one cause to point to, no sole symptom to single out. Instead, there are a million different symptoms, each with its own separate cause. By themselves, these symptoms often don't seem like all that much to be concerned about, and they often don't appear to be related to one another. In the absence of a clearly definable problem with a clearly definable cause, it's only natural for us to think that there really isn't a problem at all.

Unfortunately, there is. It's just not on the front pages of your newspaper. Instead, the evidence that our homes are becoming more hazardous places to live is widely scattered and all too often buried in obscure places like scientific journals that most of us never see. It's hard to find and almost always aggressively discredited by the chemical companies and trade groups whose products' safety is being called into question. In the general absence of widespread media coverage and public alarm, consumers are left to hunt down the clues independently and make their own coherent case that something's wrong. It's a task for which few of us have the time or resources, and even if we could afford the effort, the dots we need to connect are often less than obvious as evidenced by these apparently disconnected facts:

- Forty percent of all Americans will get some form of cancer during their lifetimes,<sup>3</sup> and the American Cancer Society has admitted that the incidence of cancer is expected to double by 2050. Half of all men and almost a third of all women alive today will face this disease.
- Women who work in the home have a 55 percent higher risk of developing cancer and/or chronic respiratory disease than women working outside the home.<sup>4</sup>
- In recent years, over two million household poisonings have been reported annually, 60 percent of which occurred in children under 13 years of age.
- The average sample of breast milk produced by a women in the US contains over 100 contaminants.<sup>5</sup> Some 25 percent of the breast milk supply is now so laden with toxic foreign substances that if bottled and sold as a food product it would violate federal food safety regulations.<sup>6</sup>
- Between 1986 and 1995, the incidence of endocrine and chronic metabolic diseases like diabetes increased 20 percent.<sup>7</sup>

- From 1980 to 1994, the number of people with asthma increased 75 percent and the number of children under four with the disease rose by an explosive 160 percent.<sup>8</sup>
- According to some estimates, a man born between 1970 and 1980 produces three quarters the amount of sperm as a man born between 1950 and 1960.<sup>9</sup>
- Between 1982 and 1995, the number of women of childbearing age who reported difficulty achieving successful conception increased 42 percent. According to the US Department of Health and Human Services, 8 percent of all reproductive-age couples in the country are infertile.<sup>10</sup>
- Allergies are now causing Americans to make 17 million physician visits each year and spend approximately \$6 billion a year in allergy-related costs.<sup>11</sup>
- In various surveys, 15 to 30 percent of Americans (44 to 88 million people) report unusual reactions — in the form of headaches, skin rashes, coughs, breathing difficulties, ringing in the ears, and other health problems — to common chemicals such as those found in detergents, perfumes, solvents, pesticides, pharmaceuticals, and foods.<sup>12</sup>

Who would think to put these and other seemingly unrelated anecdotes together to paint a broad picture of an increasingly unhealthy world, let alone conclude that world was waiting for us at home, the very place where we think we're safest from danger? The pieces of this puzzle often just don't seem to go together and the puzzle itself is just too large and too complex for most of us to assemble on our own.

That's why we've written this book. We know where the pieces to the cleaning product puzzle hide. We know how to put them all together. And, most importantly of all, we know how to fix the hidden problems they point to in our homes. We know where the best and safest non-toxic solutions and alternatives lie. And we know how your family can put these solutions to work to build a safer, healthier home. For over fifteen years we've been using this knowledge to help people help themselves and the environment around them. And now we'd like to share it with you.

Our effort to create a better, safer place for all living things started with a simple question: what is a healthy home? We think it's a place built upon a foundation of precaution, one where unnecessary risks are kept to an absolute minimum and living spaces are kept free of hazardous toxins and other dangers. But it's more than that. In our experience, a healthy home must extend into the larger world beyond our windows. By definition it means not only making sure that the activities that take place inside our houses are as non-

toxic as possible, but also doing whatever we can to make sure that these activities don't negatively impact the environment outside.

This book is an introductory guide geared toward making it as easy as possible for you to make better, safer decisions and get things done. It's not our intention to provide complex technical examinations of the many issues we'll be addressing within these pages. Though we'll certainly be offering all the latest information you need to understand why particular changes are necessary, why certain chemicals are dangerous, and why some products are better than others, a wealth of available resources already talk about these issues in great detail. (Don't worry, we'll tell you where to find them!) What's missing from the mix is the one thing we intend to provide: an easily used, at-a-glance guide to concrete actions you can take to make your home safer and keep your family healthy.

After a bit of useful background information on the broader issues involved in the art of non-toxic cleaning, we'll dive right into the things you need to care about most. You'll find lists of dos and don'ts, suggestions for healthier options for your home and family, detailed advice on product choices in easy-to-use charts, and resources to help you find the solutions and products we recommend. Take advantage of it all, and you'll have created what we think is the most important thing of all: a healthier place in which to live.

Before we embark on this journey, there's one last thing that needs to be said: our book is not about sacrifices. It's not about making do with things that don't work, settling for arrangements that don't satisfy, or denying your family the comforts and conveniences they want and deserve. It's about finding the alternatives and making the changes that produce the results you're looking for without the unhealthy side effects so often found in today's conventional products. While you may make some small compromises along the way in the name of a safer environment inside and outside your home, they will be mere footnotes in a far larger and more important story. That story is about safe cleaning solutions that work as well as traditional chemical cleaning products, and this book will tell you everything you need to know to make them work for you.

## SECTION ONE

# The Case for Change at Home

**T**HE HISTORY OF CHEMISTRY is almost as long as the history of humanity itself. From ancient wines to modern plastics, the science of combining molecules of different substances to produce brand-new compounds has played a crucial role in the human story for countless thousands of years.

In many cases, chemical processes and the substances they create have resulted in immeasurable enhancements to our quality of life. Indeed, were it not for chemistry, our modern world would bear little resemblance to the one we know today. The myriad modern conveniences we enjoy, from our computers to our cars, simply would not exist, and our standard of living would no doubt be far lower.

Clearly, chemistry itself is not a bad thing. It's the kinds of chemicals we make and use that matter. Like most anything else, there is a good side and a bad side to all the molecular manipulation chemists practice. There are safe chemicals, and there are unsafe chemicals. Our problem today is that we don't really know which are which.



## Here Come the Chemicals

The modern chemical revolution is a by-product of the petroleum revolution. Experimenting with crude oil, researchers discovered that the chains of hydrocarbon molecules it contained could easily be broken into segments that could then be combined with other materials to create a dizzying array of new substances and materials. When this secret was revealed, the petrochemical age was born, and soon hundreds and then thousands of seemingly miraculous new products were making their way into American homes, each of them hiding any number of never-before-seen substances inside.

At first, no one questioned all this chemistry. In the post-World War II boom of the 1940s and '50s, chemicals and the products made from them were seen as the shining symbol of a modern new prosperity being built by American ingenuity. All across the country, natural was out and synthetic was in. In the kitchen, new time-saving frozen meals and instant just-add-water foods were the height of haute cuisine. In the garden, laborious weeding and bug-infested crops were replaced by a few quick sprays of the latest miracle weedkiller or pesticide. In the closet, wrinkle-free polyester replaced old-fashioned cotton. From plastic wrap to spray wax, people marveled at the amazing wonders science seemed to be inventing every day, and the slogan of the DuPont Company, "Better Living Through Chemistry," was adopted as the unofficial mantra of a grateful nation.

Then, in the early 1960s, the first ripple in the pond of progress appeared. A young marine biologist read a letter in the *Boston Herald* from a reader who claimed that DDT being sprayed to control mosquitoes was killing local songbirds. Curious, the biologist began investigating whether or not there were any ecological side effects being created by the wide-spread use of DDT and other chemicals. The biologist's name was Rachel Carson



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