

Naturally Dangerous

Surprising Facts About Food,
Health, and the Environment



"OF COURSE IT'S SAFE. IT HAS NO PRESERVATIVES,
NO ADDITIVES, NO ARTIFICIAL COLORING..."

JAMES P. COLLMAN

Naturally Dangerous

SURPRISING FACTS ABOUT FOOD,
HEALTH, AND THE ENVIRONMENT

James P. Collman

PROFESSOR OF CHEMISTRY
DEPARTMENT OF CHEMISTRY
STANFORD UNIVERSITY



University Science Books
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University Science Books

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Naturally Dangerous

Preface

This book has been written so that it can be understood by all readers—nonscientists, engineers, physicians, and scientists alike. Other than a few molecular formulas such as H_2O and O_2 , there are no long chemical formulas, nor is there any math. The material included should be of interest to everyone because it relates to molecules and phenomena that affect our everyday lives. You will find surprising things: little-known facts about organic and commercial foods, natural herbs, modern medicine, and the environment. Interesting historical facts behind certain issues are sprinkled in the text. For example, did you know that George Washington gained advantage over the British forces by inoculating his troops with live smallpox virus? You will also discover that nothing is completely safe nor risk-free, even natural substances. For example, ingestion of grapefruit juice may be much more hazardous for certain people than ingestion of pesticide residues. You will encounter the recurring theme that, in many situations involving real or purported health risks, there is no “free lunch,” or perfect solution, but that choices must be made balancing one risk against another.

This account includes many fascinating subjects, perhaps too many to digest by reading the book from beginning to end. The good news is that you can start anywhere and move about the book, as the chapters each stand alone. The Contents and Index both should help guide you in browsing or reviewing topics that interest you. Scientific terms are defined in the Glossary. For those who want more information or original sources, a Further Reading list is included at the end, organized by chapter. After reading this book, I hope you will recommend it to your friends and neighbors.

— *J. Collman*

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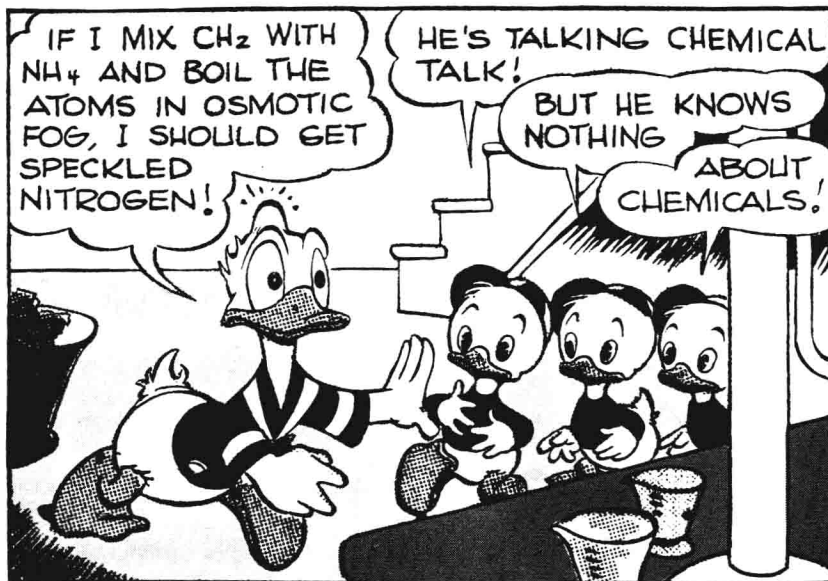
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Scientific illiteracy is everywhere!

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OVERTURE

Is Anything Safe?

MANY AMERICANS are under the mistaken impression that if something is “natural,” it is safe. Perhaps this is the reason many people like the idea of organic foods; they are afraid of synthetic insect repellents or herbicides in commercial foods. Because of possible bacterial contamination, however, some organic foods are not entirely safe. Many substances found in nature can be deadly. Eating wild mushrooms, for example, can be fatal.

I have written this little book for intelligent, curious nonscientists to provide them with sobering facts about food, health, and the environment. If you think that organic foods or herbal medicines are completely safe, or if you believe in nuclear-free zones, read on. You will learn that some organic foods are potentially more hazardous than foods treated with pesticides. You may be surprised to discover that even everyday munchies such as potato chips and french fries contain hazardous, unnatural, *trans* fats.

To some degree, almost everything has the potential to be toxic, even those substances we require for life, such as oxygen. In this book, you will also discover that all humans are radioactive and that we emit thousands of high-energy gamma rays per minute. Perhaps you are curious about the science and the hype behind global warm-

ing and the ozone hole. Is the sky truly falling? You will discover that most of these issues are complex and there is no simple solution or “free lunch.” Let’s begin with toxic chemicals. The story goes back many years.

Since the days of Paracelsus, a German physician–scientist of the 16th century, doctors and chemists have known that the effect of a substance on the human body, be it good or ill, depends on the concentration in which it is taken. In the latter part of the 20th century, this bit of common sense gave way to an irrational fear of “chemicals,” in particular, of anything that is not natural. Fear of cancer and of carcinogenic (cancer-causing) substances has become especially acute.

In the following accounts, you will see that these fears are not always based on sound scientific principles and are causing economic and even medical harm. At present, many people are ingesting large amounts of unstudied, natural herbal medicines, some of which can be dangerous. Don’t be fooled by the word *natural*. Natural is not synonymous with *safe*. Arsenic, pennyroyal, botulism toxin, and urushiol (the rash-inducing substance in poison ivy) are all natural—and are highly poisonous.

The general public is frequently assailed by news reports concerning dangerous, toxic chemicals. The public is also led to believe that only natural substances are safe and that synthetic additives and agrochemical residues are dangerous. Such reports rarely present balanced analyses of the science underlying these complex issues.

This book attempts to probe some of these issues and to put them in a more balanced perspective. The underlying origins and degree of hazards are analyzed. Two themes emerge from this analysis: (a) nothing is absolutely safe; both natural and artificial chemicals can be dangerous; and (b) the safety and/or effectiveness of any particular substance varies with its concentration and with which part of the body is exposed. For example, an additive in many ice creams could give you emphysema if it reached your lungs, but it is safe to ingest.

You may know that cyanide is poisonous. The toxicity of cyanide is well understood. This chemical blocks the major enzyme, cytochrome oxidase, that all aerobic organisms require for respiration. But did you know that cyanide occurs naturally in certain foods and in herbal remedies that can be purchased in grocery and health-food stores? Cyanide from these natural sources is not necessarily toxic. It is the *concentration* that makes cyanide lethal.

Exaggerated Health Scares and Scientific Ignorance

To illustrate how scientific illiteracy affects public opinion on what is hazardous, consider the following story reported on the Urban Legends website (www.snopes2.com). A high-school student distributed a warning about a widely used chemical, “dihydrogen monoxide,” a colorless and tasteless substance that causes thousands of deaths annually. The warning noted that the compound also causes severe hydration and frequent urination, can cause sweating and vomiting, and in its gaseous state, can cause severe burns. Included was the statement, “Accidental inhalation can kill you!” and the facts that the substance has been found in tumors of terminal cancer patients, contributes to soil erosion, and is a major component of acid rain. (The student did not mention that this chemical is present in the bodies of all living people, sick or not, nor that the most common way it can kill people is by drowning.)

When 50 recipients of the notice were asked if they would support a ban of this chemical, 43 said yes, 6 were undecided, and only 1 knew that the chemical was water!

Jane Brody, a highly respected science writer for *The New York Times*, reported the following unfounded or overblown health scares. Alar, a chemical used to synchronize the ripening of apples, was denounced in 1989 on the television program *60 Minutes*. An environmental activist group supported by the actress Meryl Streep claimed alar was “the most potent cancer-causing agent in our food supply” and was a cause of childhood cancer. Immediately, alarmed parents dumped huge quantities of apples and apple juice and cost the apple industry about \$375 million in lost purchases. As a result of this panic, alar was removed from the market by its manufacturer. Subsequent tests by the National Cancer Institute and the Environmental Protection Agency failed to show alar caused cancer except in doses between 100,000 and 200,000 times the normal amount a child might consume in a day’s ration of apple products. In this book, you will discover that unpasteurized apple juice can be dangerous to children and adults—because of bacterial contamination from cow manure!