

## BOOKS

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## SAFETY IN A HAZARDOUS WORLD

REVIEWED BY NATALIE FOSTER

So--What supplements do you take? Come on, be honest! Just because you're a scientist, don't try to tell me that you haven't been intrigued by the claim that eye of newt or toe of frog increases energy, improves performance, ensures health, or promises a stronger, faster, more youthful something in your life.

With the market for herbal preparations, vitamins, minerals, and nutraceuticals in the U.S. already estimated at \$4.6 billion as long ago as 1994, the probability that you or people you know have regularly taken some allegedly physiologically active substance not prescribed or even recommended by a physician is virtually 100%. The Food & Drug Administration estimates that 40% of the U.S. population uses some type of nutritional supplement.

Among my immediate friends, I count a deli owner who swears by St. John's wort to get him through the long haul between Labor Day and Thanksgiving ("Hey, it can't hurt."); an amateur power lifter and fellow chemist who has probably tried every strength enhancer ever mentioned on the pages of Muscle and Fitness ("Except andro! McGuire is wrong--it's useless."); and a professional singer who does not approach the cold and flu season without a supply of echinacea ("It's not like I take it every day.").

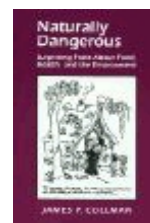
I'll confess that I've been pulled into the vortex, too. I was convinced a while ago by the wife of a colleague, who earlier had been convinced by the late Karl Folkers, the pioneering and visionary researcher in chemistry and clinical medicine from the University of Texas, Austin, that the minimum daily requirement (MDR) for the B vitamins was egregiously low and that I should supplement my intake to forestall carpal tunnel syndrome. What am I to think now when a close friend recommends CoQ10 (ubiquinone) and my perusal of the literature uncovers the same Karl Folkers suggesting that we should all consider taking that, too? Navigating these complex issues is difficult for scientists; what's the poor layperson to do?

Similar quandaries arise on a larger scale over environmental issues, where decisions about substances and their associated risks have broader political and economic consequences. Did you know that 7% of annual global carbon dioxide emissions come from cement kilns, but the proposals from the European Union for taxes on energy aimed at reducing CO<sub>2</sub> production exclude the cement industry? Is global warming an international crisis, or do human activities play an insignificant role in this phenomenon? What do any of us do when experts disagree on these issues?

For starters, we can all turn to James P. Collman's book "Naturally Dangerous: Surprising Facts about Food, Health, and the Environment." Collman is the George A. & Hilda M. Daubert Professor of Chemistry at Stanford University; a member of the National Academy of Sciences; and a well-known, highly respected researcher. Many chemists know Collman as the originator of the aptly named picket-fence porphyrins. His work involves the discovery, synthesis, and mechanism of action of electrochemical catalysts for multielectron redox reactions and the design of functional biomimetic catalysts for the reduction of oxygen to water.

Collman's scientific acumen is evident throughout this book. Only an excellent communicator with a profound understanding of a subject can provide such clear and simple explanations of facts, making them totally accessible to nonscientists and at the same time satisfying to chemists.

**NATURALLY DANGEROUS: SURPRISING FACTS ABOUT FOOD, HEALTH, AND THE ENVIRONMENT,** by James P. Collman, University Science Books, 2001, 270 pages, \$29 (ISBN 1-891389-2)



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In this slim and engaging volume, Collman broaches in a lucid, no-nonsense style exactly what the title proffers. The title also sounds for the first time what is a continuing leitmotiv throughout the text: Natural does not mean safe. Indeed, Collman opens with the question, "Is anything safe?" The answer, of course, is no, and the rest of the book confirms that answer and teaches us how to go forward happily anyway. This is no doom-and-gloom treatise. It's an adult, scholarly look at the risks involved with the choices we make. This is the way it is, folks; now cope with it. Collman's second leitmotiv is that there are no easy answers.

Most chemists have no trouble with the go-forward-happily part, but nonscientists do, and it is really for them that Collman has written this book. All human activities have risk, and Collman encourages the reader to seek balance. Irrational fear, as well as irrational exuberance, can lead to personal injury, political dislocation, or economic harm to individuals and to society. Nothing is absolutely safe, and when chemicals are the issue, Paracelsus (1493–1541) said it all half a millennium ago: Only the size of the dose separates the medicine from the poison. For a scientist of Collman's credibility to deliver Paracelsus' message now in a modern form palatable for the layperson is an extremely valuable contribution to the literature.

Early in the text, Collman relates the urban legend about the high school student who distributed a notice about the thousands of deaths caused each year by "dihydrogen monoxide." The notice stated that ingestion of this chemical could cause extensive hydration, frequent urination, sweating, and vomiting; exposure to its gaseous form causes severe burns; inhalation can be fatal. Furthermore, this chemical is found in the cells of malignant tumors; it is also a component in acid rain. According to the legend, 43 out of 50 people who read this warning agreed to support a ban on this chemical. The real lesson here goes beyond the scientific illiteracy of the public, who don't realize that the chemical being described is water. The key point is none of the facts cited about the substance is untrue. The picture is simply conveniently incomplete--all risk, no benefit. We must be as suspicious of this as of its counterpart--the all-benefit, no-risk scenario.

A friend asks, "I'm thinking of taking selenium to raise my HDL. What do you think?" She clearly craves a yes-or-no answer, but Collman shows very unambiguously that such a simple response is not possible on complex issues. Here's the good news from Collman: A 10-year-long double-blind study showed a significantly lower incidence of several cancers in addition to higher levels of high-density lipoprotein (HDL) in a group taking selenium, compared with a group taking a placebo. Here's the bad news: Selenium is also quite toxic and has a narrow therapeutic index. A little is essential, but a little more is deadly.

Here's an interesting solution to consider: Eating two Brazil nuts fresh out of their shells provides more than the minimum daily requirement of selenium. Collman makes the case in this and several situations that eating foods rich in a particular substance is different from taking a supplement and may be both a less risky and a more efficacious means of delivering an essential substance to the body. The book is replete with exactly this sort of interesting information.

Beyond the content, which is genuinely intriguing--did you know that cat litter is a source of radiation pollution?--perhaps its next best feature is the book's organization. The flow of chapters is logical and again mirrors the title. A discussion of food and essential nutrients moves smoothly into the realm of the pharmacy and from there into the health-food store. Disease, cancer and the environment, and then environmental issues follow one another, with a closing chapter on radioactivity. However, the chapters each stand alone, and you can easily begin reading anywhere in the text, search out items of interest in the index, or just browse and enjoy whatever topic catches your eye.

No book, especially one this short, can be comprehensive on these issues, and a few very popular supplements are missing from Collman's smorgasbord. I wish he had included CoQ10, DMEA [2-(dimethylamino)ethanol], and creatine. But I will gladly trade those topics for others he has included that are not inherently chemical. He gives solid advice about using electric blankets and cell phones--is either linked to cancer? (No link has yet been established.) Do magnetic fields relieve arthritis? (No differences in health have been

observed between people wearing magnets and those not.) Does irradiation of food make food radioactive? (No, gamma rays are energy, not a substance, and do not contaminate the food.)

Throughout the book, cartoons from Sidney Harris, the New Yorker, "The Far Side," and other sources put the factual information in the proper perspective and lighten the spirit. "Naturally Dangerous" is eminently readable, especially in the browsing mode. In larger doses, the style sometimes becomes a bit tedious and the reader of long sections may crave more variation in the pace of the language. But these points are trivial because the content and the level are key, and they are excellent.

Anyone who seeks a balanced perspective on the risks that accompany the myriad choices we make daily about diet, health, and our impact on the environment can find valuable information in this book. Chemists can read, enjoy, and learn from the stories. Furthermore, although bestowing gifts can be fraught with risks, the benefits of giving this volume to a nonscientist could be legion. I recommend we all become advocates of Collman's approach and assume that risk.

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