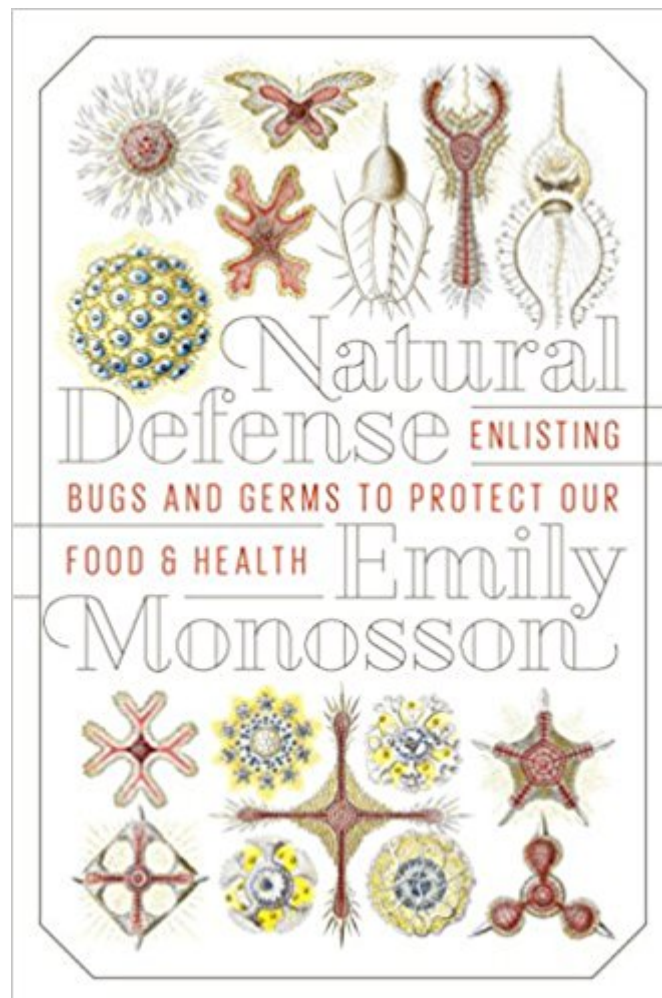


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# Natural Defense: Enlisting Bugs And Germs To Protect Our Food And Health



## Synopsis

For more than a century, we have relied on chemical cures to keep our bodies free from disease and our farms free from bugs and weeds. We rarely consider human and agricultural health together, but both are based on the same ecology, and both are being threatened by organisms that have evolved to resist our antibiotics and pesticides. Patients suffer from *C. diff*, a painful, potentially lethal gut infection associated with multiple rounds of antibiotics; orange groves rot from insect-borne bacteria; and the blight responsible for the Irish potato famine outmaneuvers fungicides. Our chemicals are failing us. Fortunately, scientists are finding new solutions that work with, rather than against, nature. Emily Monosson explores science's most innovative strategies, from high-tech gene editing to the ancient practice of fecal transplants. There are viruses that infect and bust apart bacteria; vaccines engineered to better provoke our natural defenses; and insect pheromones that throw crop-destroying moths into a misguided sexual frenzy. Some technologies will ultimately fizzle; others may hold the key to abundant food and unprecedented health. Each represents a growing understanding of how to employ ecology for our own protection. Monosson gives readers a peek into the fascinating and hopeful world of natural defenses. Her book is full of optimism, not simply for particular cures, but for a sustainable approach to human welfare that will benefit generations to come.

## Book Information

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## Customer Reviews

Hiding in plain sight all these years, the microbiome has been providing exciting new paths for discovery, wonderment, and amazement. Looking at the world with new eyes, we can (at last) see that the air, soil and water themselves contain microbiomes, with similarly impressive properties. Natural Defense is the latest addition to the burgeoning shelf of biomic revelations. This one is focused on practical application. It is all about how we can improve ourselves and save our planet from, well, us. The basic message is that Nature has it handled. We can do better learning from Nature than by creating poisonous chemical compounds by the tens of thousands. Monosson begins with the story of fecal transplants, suddenly in vogue in the West. They seem to cure a wide swath of otherwise unmanageable conditions. Sometimes overnight, after months of antibiotics have failed. The Chinese figured this out a thousand years ago. The FDA is still not convinced, but is tolerating it. Next up are phages, which target specific pathogens. If we figure out how phages and pathogens line up, we can have an endless cheap supply of tightly targeted miracle meds that have worked, by evolutionary design, for eons. We have begun trying some of this. We do use sex odors — pheromones, to confuse destructive moths. It saves spraying pesticides on fields, saving fruit crops from becoming worthless almost overnight. With pheromones, it is a matter of milligrams per acre, compared to carpet bombing with pesticides. For some reason, despite the evident, documented success, pheromone treatments have not made a big dent in the market, she says. As with anything in science, acceptance is problematic. Natural Defense is a most accessible, plainly written briefing on the state of our ignorance and the wonderful vistas opening up to us. As Monosson says in the Epilogue, each chapter could become its own book. Some of those books have been written, and many more are on the way. This is a fine, fast intro. David Wineberg

We know that the use of chemicals on the farm leads pests to develop resistance. And we know that the indiscriminate use of antibiotics is leading human pathogens to develop resistance as well. The promise of “better living through chemistry” appears to have stalled. What comes next? In Natural Defense, Dr. Emily Monosson takes us on a tour of new

technologies coming down the pipeline, based on biology and high-performance computing rather than chemistry. These include, in medicine, fecal transplants, phages (viruses that attack specific bacteria), and bacteriocins (chemicals that bacteria engineer to attack each other). In agriculture they include bottled bacteria as well as use of pheromones and other "semiochemicals" to confuse and deceive insect pests. In both domains, advances in genetic sequencing and computing technology may make it possible to identify pathogens much more quickly and accurately. Part of the fascination of the story is the tracing of parallels between the ecology of the soil and that of the human gut. *Natural Defense* is well-written and accessible, full of anecdotes and real-world examples and not too heavy on jargon. It offers a sensitive and nuanced discussion of controversial topics like vaccines and GMOs. And it is concise (about 150 pages plus notes). As well as giving a fascinating tour of the kinds of advances being made in medical and agricultural science, the book suggests some broader questions. If we are finally moving beyond the false (or flawed) promise of "better living through chemistry," are we moving into an era of ecological wisdom? Or just another chapter of technological hubris? While medical research gets generous public and private funding, is agricultural research at risk of dying in the vine? And how will the benefits of these cutting edge and often expensive new technologies be distributed?

I am torn about this book. I like Emily Monosson's writing style. She uses plain language and presents the science clearly. On the medical chapters, she follows the science stringently which is great. But on the environment she subtly undermines the science by, for example, promoting organic foods and by giving equal emphasis to two sides of the GMO argument on yellow rice. Running through the book is an undertone of natural is good, synthetic is bad. Nonetheless I enjoyed the book and hence gave it the 4-star rating. Disclosure: I received a complimentary copy of this book for review purposes.

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