HERBAL ANTIBIOTICS, by Stephen Harrod Buhner
Book Report and Comment by David G. Schwartz, M.D.
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Are we headed toward a return to the pre-antibiotic era, which few of us alive today remember. The rise of multi-drug resistant "super-bugs" is exponential, and the production of new antibiotics has been more arithmetic, and has now reached a plateau, and may soon be diminishing. It is not profitable for pharmaceutical companies to put out the expense to produce new antibiotics when they will soon be obsolete. Continuing current trends, it is only a matter of time when most of the common infections will not be sensitive to any existing antibiotic. We may then have to depend on herbs and other natural therapies to prevent and to treat infections.

Stephen Buhner is an herbalist and award-winning author of 14 books, including Healing Lyme, Herbal Antivirals, and The Lost Language of Plants. James A. Duke, Ph. D., author of The Green Pharmacy, writes the Forward. He states, "The frightening truth you won't find in The Journal of the American Medical Association: We are running out of weapons in the war on germs."

This author explains the causes of antibiotic resistance, explores the value of herbal treatments, gives in depth info on each of the most effective herbs, a comprehensive review of scientific research, and instructions to the reader on obtaining the herbs, and on making the medicines.

In the Prologue is a quote from Steven Projan, author of Bacterial Resistance to Antibiotics: "In the 1940's the successes of …streptomycin and tetracyclene led many to believe that bacterial infections were basically conquered. That concept led to widespread misuse and outright abuse of antibacterial agents." He further states that many current obituaries report, "Died from complications following surgery," but what is not well understood, is that, "these complications are quite frequently multi-drug resistant infections." Buhner states that, "other than factory farms, hospitals and doctors' offices are the primary breeding ground of super-bugs. A simple injection or a minor surgery can now, fairly routinely, lead to months in the hospital, or loss of limb, or loss of life." Millions of people every year in the U.S.A are getting resistant infections and hundreds of millions around the globe. These are infections that are resistant to common antibiotics, but there is a smaller number who get infections that are totally resistant to every antibiotic, and that number is steadily rising. Hospital-acquired resistant infections are now the 4$^{th}$ leading cause of death in the U.S.A.

Most people don't realize that when a treatment is completed, the antibiotic doesn't go away. Antibiotics form a large part of hospitals' waste streams, pass through the G.I. tract of people who get Rx's from their doctors' offices, enter the sewer systems, and pass relatively unchanged through treatment plants and into the drinking water. Factory farms give around 30 million pounds of antibiotics to food animals (pigs, chickens, cows) indiscriminately to make them gain weight faster and to keep them from getting sick from over–crowding. The millions of gallons of excrement flow into local ecosystems, and open range animals deposit their antibiotic-laden feces directly onto the ground. Many of these antibiotics are not easily degradable, only by heat or sunlight. These antibiotics kill broad groups of diverse susceptible bacteria. A physician and researcher Stuart Levy remarks, this massive dumping of non-biodegradable antibiotics over the past 65 years has "stimulated evolutionary changes that are unparalleled in recorded biological history." This constant exposure of bacteria to these antibiotics leads to their adaptation to become resistant. This surprised the evolutionary biologists that predicted that, because spontaneous mutations occur very infrequently, resistance would not be possible in only 35 years, or that the end of the antibiotic era could occur after only 60 years of use.

Now these bacteria are not only resistant to antibiotics but they are also more virulent, stronger, more aggressive, leading to the term, "super-bugs." These may not so much occur in the larger environment, but mostly they come from hospitals. What makes them so virulent? In hospitals, it makes sense that it is the more dangerous bacteria that are the ones that send people to the hospital. The weaker bugs don't make people so sick, and people recover at home, sometimes without antibiotics. So the really aggressive bacteria are the ones that get greater exposure to more antibiotics in the hospitals, and have greater opportunity to develop resistance.

We have to realize that bacteria have been around a lot longer than we, about 3 billion years, to adjust to harsh environments. Those environments have fungi, bacteria, and plants that produce antibiotics. Before we ever started using antibiotics, the bacteria were already several steps ahead of us. They could protect themselves from many antibiotics, as other organisms were producing multiple antibiotics to protect themselves from the bacteria. Things were in balance. Then when humans started mass production of large doses of single antibiotics, the bacteria had to step up their game several levels to deal with the onslaught. They had developed many strategies in their toolboxes to use in various situations, and now they had to "pull out all the stops." That is essentially what they now have been doing in the past several decades, and humans have severely underestimated their naturally powerful adaptive mechanisms for their survival.

How smart are bacteria? After placing a single bacterial species in a nutrient solution containing sub-lethal doses of a new rare antibiotic, quickly the bacteria developed resistance to that antibiotic and to 12 other antibiotics that they had never before encountered. It is as if they anticipate the confrontation of other drugs when they resist one. It's as if they are anticipating the creation of antibiotics that humans have not yet thought of.

Bacteria share resistance information and virulence factors with other species of bacteria. As Stuart Levy observes, "one begins to see bacteria, not as individual species, but as a vast array of interacting constituents of an integrated microbial world."

Wherever antibiotic usage is high, such as in hospitals, factory farms, nursing homes, etc., bacterial congregation and rate of learning are also high. And there is no place on Earth that contains more resistant bacteria than hospitals. Most doctors' and nurses' hands are covered with resistant bacteria, whether they wash their hands or not. And hand sanitizers are often less effective than washing. It makes sense to avoid going into the hospital unless the risk of loss of life or vital organs is at stake.

Some of the ways bacteria develop resistance are: altered uptake, target modification, antibiotic modification, and efflux pumps. They share resistance with other bacteria by means of encoding plasmids, transposons, and integrons, and using bacteriophages.

Bacteria respond to exposure to antibiotics by altering the permeability of their cell membrane, making it more difficult for the antibiotic to "sneak in" with other nutrients coming in. The bacterium can also alter its internal structure that was targeted by the antibiotic, so it has no effect. Bacteria can develop antibiotic-specific inactivation or disabling compounds so the antibiotic becomes inert. One example is Beta lactamase enymes inserted into the cell membrane, to catch the antibiotic before it ever gets into the cell. One type of beta lactamase called NDM-1 is carried on plasmids and transfers to a wide range of bacteria. This inactivates the carbipenem antibiotics, which for a long time avoided inactivation by beta lactamase. Another mechanism is the efflux pump. Bacteria can pump out antibiotics as fast as they come into the cell. Five main forms of efflux pumps have been a part of bacterial defenses against millions of antibacterial substances in the world, including stomach acid and bile acid, developed long ago, long before human usage of antibiotics, so they have had plenty of experience with this tool that they can use on antibiotics.

Bacteria have super adaptability, and can live in cleaning solutions, and some can even use antibiotics as food.

Bacteria of different species can collaborate. Once a bacterium develops a method of resistance, it rapidly passes the knowledge on to other bacteria. This inter-species communication was not known before the advent of the antibiotic era.

Bacteria encode chromosome-independent DNA strands called plasmids that contain resistance information, which they pass on to other bacteria. For example, the aminoglycosides, a most potent group of antibiotics, came originally from the actinomycetes group of bacteria, used to defend against invading or competing bacteria, but in order to keep the aminoglycoside from killing its own bacteria, the actinomycetes used a resistance factor that they kept sequestered inside the plasmid inside its cell. When aminglycosides began being used promiscuously by humans, the Actinomycetes released these plasmids abundantly.

Transposons are movable segments of bacteria DNA that are a normal part of its genome. They can easily move between chromosomes and plasmids, and are sometimes called "jumping genes." Integrons are another type of DNA that integrates into the genome. Both transposons and integrons release resistance information into the environment, and integrons transfer virulence factors as well.

Bacteriophages are viruses that infect bacteria. If they don't kill the bacteria, they may incorporate bacterial DNA that has resistance information into their own genome, which they pass on to the next bacteria they infect.

So when bacteria share resistance information, they can combine resistance information from multiple sources that can generate new resistance pathways. This information is encoded into the DNA that can be passed on to their descendants forever.

When bacteria are constantly exposed to low doses of antibiotics, it is an excellent opportunity for developing resistance. Note that the water supply of all industrialized countries are contaminated with minute quantities of antibiotics.

Bacteria restructure their DNA in response to stress. If that stress is the oxidative damage caused by antibiotics, the genome is redesigned to counter the oxidative stress caused by <u>any</u> antibiotic.

When we "declare war on bacteria," we overlook our need for beneficial bacteria to keep the pathogens in check. If our immune defenses are not working, no matter how many antibiotics or herbs we use, we will not prevail. It is mainly the healthy terrain of the body that protects against infection, and antibiotics and herbs only assist one's own defenses. The major decrease in infectious disease in the world, often credited to antibiotics and vaccines, were mainly brought about by public sanitation and hygiene.

I have hereto described the situation of antibiotic resistance as a prologue to the main content of the book, which is his presentation of herbs for major categories of resistant infections. He states that these are only suggestions, and that many other herbs not listed here could also be beneficial. Nonetheless, I think it would be good for every household to have a copy of this book as a resource. It may be advisable to actually keep a stock of some of these herbs for each household, because when an acute, severe infection occurs, time may not allow ordering them.

He describes in detail the characteristics of each herb recommended, the usage, dosage, possible adverse effects, drug interactions, sources, cultivation, preparation, traditional uses, plant chemistry, and research. The specific formulas are for each separate bacterial infection, and listing all the herbs here in general would not be very practical. I recommend getting this as a reference book, looking up each infection as needed, or keeping some herbs on hand, especially the immune building herbs, such as Ashwaganda, Astragalus, Boneset, Echinacea, Eleuthero, Red Root, Reishi, Rhodiola, and maybe some of the antimicrobial herbs listed. As the time comes in the not too distant future when most antibiotics will be ineffective, it may be good to stock all these herbs and to make them available as needed to family and friends. Though it may seem unlikely, maybe the medical profession by that time will start to stock them too.

He describes the immune building herbs, some remedies for common mild infections, and an extensive formulary of common herbs and their usages.

Why do antibiotics not develop resistance to herbs? Plants are much more sophisticated than antibiotics. They have also been around much longer than we have been, and have long experience with bacteria and other microbes. They have had time to develop long-term efficacy. Each plant does not just produce one substance. They have many anti-microbial substances that work from many angles. When we isolate only one constituent from a plant, resistance can develop to that, but when we use the whole complex array of defenses of that plant, they continue to work, especially if several herbs are used in combination. We have not begun to understand the vast complexity of the integrated defenses used by the plants. Modern science often studies one or two constituents of the plant, and oversimplifies the intricate workings of botanical medicine. There is no guarantee that any herb or antibiotic will have the intended effect, but these plant medicines have had a long history of beneficial use by herbalists, and this book has more than one page of references for scientific studies on every one of the herbs listed, and over 60 pages of bibliography.

The author makes the point that most of the research in this country is on chemical drugs and very little on plant medicines, but throughout Asia, Africa, and Latin America, there has been a plethora of good research done on herbs in the last few years, and the purpose is to make herbal treatments available widely, as a public health measure, not for the purpose of major financial profitability for a few companies. Many of his citations of research are from these various countries.

He ends the Epilogue with an old warning, "Chymia egregia ancilla medicinae; non alia pejor domina, Chemistry makes an excellent handmaid, but the worst possible mistress." I say chemical drugs have their place, and they should "stay in their place."

To round out this topic, the book, Beyond Antibiotics, by Schmidt, Smith, and Sehnert, gives an excellent discussion of how strengthening the immune system makes infections less likely, and makes recovery from infections more likely.

Without a functioning immune system, you can take all the antibiotics, herbs, and homeopathic remedies you want, but you will die. All these herbs that are recommended need a strong immune system and a healthful lifestyle to have the best chance of success.

Beyond Antibiotics covers nutritional deficiencies, food intolerances, sugar excess, thyroid problems, eating environment, fiber, environmental threats, toxins, dental amalgams, electromagnetic pollution, mold in the home, strategies to remove and avoid toxins, mood, mind, stress, laughter, and positive attitudes, beliefs, and relationships. It discusses Vitamin C and other supplements, essential oils, herbs, homeopathy, and hands on healing. All these are important for good immune function. It also gives tips about what to do for common viral infections without using antibiotics. Tierona Low Dog's book Healthy At Home, for which I made a report in the archives, also details home remedies. The more we can confidently use natural methods and can avoid resorting to using antibiotics, we help to delay that point in time when antibiotics no longer work. We also are more likely to develop the skills needed for that time. Let's be smart and use the gifts nature has given us.