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A Cuisine for Medicine

The challenge we face today is figuring out how to escape the worst elements of the Western diet and lifestyle without going back to the bush.

MICHAEL POLLAN, *IN DEFENSE OF FOOD*

While I was growing up in Ferrara, Italy, my father would pick up my sister and me from school almost every Wednesday in a small, yellow Fiat 500. This was usually right before lunchtime (school days were short in Italy, but you didn't get Saturday off). We would bump along cobblestone streets for a while and then stop outside a small shop that sold fresh-made pasta. I remember the smell of flour, and you could see some cooks in big white aprons mixing it with oil, eggs, and a little water to make noodles, lasagna sheets, or hand-shaped *cappellacci* ("bad hats," usually filled with squash). Others were grinding whole cuts of prosciutto to mix with herbs and parmesan cheese. This would serve as the filling for *cappelletti*, a delicious dumpling similar to tortellini that was a local specialty. It was for these we had stopped. We would pick up a pound or so, wrapped in waxed paper, take it back to the car, and head home.

For lunch, the *cappelletti* were cooked in a vegetable stock my

mother had prepared ahead of time (she taught English on Wednesdays) by simmering carrots, celery, onions, and garlic. Sometimes we'd eat the leftover vegetables—soft and juicy, barely holding together, but delicious and salty—as part of the meal. Other times, we just ate the pasta in a steaming bowl of broth, seasoned with a little grated parmesan. There would often be a salad, and my dad might have a glass of wine. Dessert was a cup of sweetened chamomile tea. We would talk or listen to the radio and all clean up together. All simple things, really—but very meaningful. Nothing too special, either: variants on this ritual were taking place all over the city.

Cuisine means “kitchen.” Kitchen, as opposed to restaurant. Kitchen, as opposed to supermarket. Kitchen, as opposed to gas station (where all too many find their food these days). By extension, cuisine is a set of kitchen habits that yield meals—meals usually prepared from simple, whole ingredients. Cuisine has matured over thousands of years and connects us to food, family, and our environment as few other things in life do. It is heartening to see a powerful movement in the United States that, at the beginning of the twenty-first century, seeks to reawaken (and reinvent) a strong, rooted cuisine that marries old ways of cooking with great new ideas on food production, distribution, and preparation.

One of the strongest voices articulating the case for a plant-centered, omnivorous cuisine in the United States is Michael Pollan. In *The Omnivore's Dilemma* he explores how we manufacture what we eat, visiting farms that embody the pinnacle of modern industrialized agriculture and also farms that offer a much more diversified, organic vision of how to produce and consume food. His analysis gives us clarity: in order to achieve good health, we need not focus on the complexities of food refining, processing, and nutritional reenriching (based on what Pollan calls “nutritionism”). Rather, we need to eat real food and prepare it in real ways, ways that involve simple recipes with simple ingredients. In the end, we get to health without overthinking, because, as we've found out, when it comes to nourishing ourselves,

overthinking the process hasn't been at all helpful. And once we build a cuisine back into our lives, all sorts of other things change as well. You can't find the best tortellini without getting to know the shopkeeper. The best vegetables come straight from a farmer at a market stand, not from a regularly misted cooler. You've got to spend some time hanging out and talking with your kids while you make and share a meal. All these changes foster relationship and connection, and the results become evident in our environment, in our villages and neighborhoods, and in our homes.

I am particularly keen on this analysis because it comes from someone whose perspective includes the idea that, somehow, plants are driving human behavior and culture. One cannot read Pollan's account (in *The Botany of Desire*) of the tulip craze that swept Holland in the 1630s and not marvel at how these organisms, which have no feet and certainly no brains (as we know them), have employed us to serve their ends. They harness our desires. So when Pollan advocates for plants as a major, important component of cuisine, it's coming from a person who knows that they are our active partners and not just commodities. Again, we see a relational view of the world.

The "Slow Food" movement (proposed as an alternative to a common type of restaurant) began in Italy and has become another leading voice advocating for a real cuisine. Carlo Petrini started this global phenomenon by standing up to McDonald's in an effort to prevent it from opening a restaurant in historic, downtown Rome. Since then, the idea of regional food that celebrates traditional cuisine and is prepared with care has swept the Western world. In the United States there are myriad local chapters of Slow Food USA. They share recipes, gardening tips, and dinner-party schedules. At a national level, the organization is active in shaping legislation that affects food, such as the farm bill. It is a tangible manifestation of a shift that is happening in modern Western cuisine.

Another conscious food choice many people are making involves where their food is grown and made. The locavore movement seeks

to support local agriculture and production, both for fruits, vegetables, meats, and grains and for value-added products, such as breads, sauces, cheeses, and beverages. Part of the concern here is the heavy investment in petrochemicals that centralized food production entails. But local food doesn't just have a smaller carbon footprint. If you support local production, you support smaller farms, farmers' markets, and local employment. You foster a community that comes together in the central square instead of the big-box-store parking lot. You might even get to know your farmer personally—or start raising chickens in your backyard. Nourishing ourselves with the plants and animals that breathe the same air, drink the same water, and walk on (or grow in) the same land as we do might have crucial repercussions for our individual health, too. Ultimately, the locavore movement strives for connection between people, land, and food—relationship-based eating at its best.

Our culture's understanding of the importance of real, whole food and where it comes from is increasing, and a new cuisine is being born. But I also hope to convince you that we might need to use some of these same ideas in our approach to achieving health and treating disease. Why do so many folks who buy all their food at the farmers' market also purchase dietary supplements that are packaged in plastic and shipped from far-flung corners of the country (or the world)? To say nothing of the centralized, industrialized production of conventional medication.

Our food certainly is the foundation of medicine, to paraphrase Hippocrates. But throughout history, human beings (and animals, too) have supplemented their diet with a range of substances to prevent illness, treat disease, and feel vibrant, inspired, and connected. It's sometimes hard to draw a line between what we eat and the medicines we use. Was that cup of chamomile tea at the end of lunch part of the meal or was it a therapeutic intervention? If you know anything about chamomile and its power to calm kids down, you might lean toward the latter categorization, but that's not necessarily a given. Other times

the distinction is clearer. No one would consider a simmered pot of willow bark tea, perhaps used to treat arthritis, to be food or even a pleasant addition to a family meal. And it might even be lethal to approach a substance such as acetaminophen (Tylenol) with the same relaxed attitude on dosing that we see with carrots.

These, then, are my questions: Might there be a cuisine for medicine? Can the kitchen serve as a pharmacy, a place where we cook up what keeps us healthy alongside what keeps us fed? These are not unreasonable questions, nor do they imply that modern medicine is something we need to eschew. I support local food systems, but I still love a well-made cappuccino. So while a good meal is the foundation of health, I think that we can take the concepts of whole foods, organic foods, and local food production and apply them to medicine as well. In so doing, we might uncover safe, effective, and easy strategies for managing the malaise of modern life, empower ourselves to become more involved in our well-being, and discover local, whole remedies we can grow and prepare ourselves instead of consuming a machine-manufactured pill.

TRADITIONAL HERBAL MEDICINE

Of course, such a “cuisine” for medicine already exists: it is called herbalism. This practice of using whole plants as medicine is actually the dominant form of primary care around the world. Three-quarters of the global population relies on herbs to treat disease.¹ Modern innovations, such as surgical procedures and pharmaceutical agents, are useful complements to this age-old way of doing things, but in the United States they have supplanted it almost completely, much as the Western diet has supplanted real food. I think we can, and should, strive for a model where modern health care technology is used to supplement, rather than replace, traditional plant-based “slow medicine.”

On every populated continent, there are ways of healing that are driven by the local flora, and they are as diverse as the cuisines with

which they share a kitchen. Some have coalesced into nearly monolithic systems, though every valley still has its own variant on the classic recipes. Even in Europe, where, in the sixteenth century, Paracelsus began applying solvent extraction techniques to plants and may thereby have started us down the path to modern pharmaceuticals, traditional whole-plant remedies are still widely used. So modern medicine is not simply today's version of traditional European herbalism; it is a completely new and different phenomenon.

In the short term, contemporary medicine is unrivaled. Powerfully life-threatening imbalances, infections, and trauma are tended to systematically and effectively in ways that would have seemed magical or miraculous in Paracelsus's time. The process of research associated with modern medicine continues to generate new insights into and understanding of physiology, biochemistry, and pathology—all the while providing the tools for the effective management of more long-term, deadly diseases, such as cancer, HIV, and advanced heart disease. Babies born prematurely, some weighing less than two pounds, can survive and go on to full, healthy, engaged lives. Diseases such as polio have been eradicated—*eradicated!*—from vast sections of the planet. I cannot comment on the long-term ecological implications of these changes, but no one can doubt that their public health impact in the twentieth century has been huge.

The purpose of incorporating traditional herbal medicine into modern life is to try to find an accessible system for addressing much more common (and less scary) complaints, a system that is understandable and can be easily implemented. As we shall see, herbalism satisfies these criteria while also positing a relational approach to healing and, more importantly, to health itself. In this sense, it is much more like cooking: something we all can learn, something that connects us to the garden. Pharmaceuticals are often like sledgehammers swatting mosquitoes; I am simply proposing that there may be a point to the techniques of more traditional medical models. For some of the more complex diseases of twenty-first-century life, these techniques may

offer real solutions where modern medicine all too often lacks a gentle enough touch.

People will always desire some measure of involvement in their health. Even the most uninterested among us still practice basic hygiene (mostly). I hope to convince you that simple herbal medicine offers an effective way to enhance health and that when it is used this way it poses no risk, while yielding real benefits. These qualities make it useful as a model for the modern consumer desiring health care empowerment. It reconnects us to a whole-plant ecology and provides clarity in a sea of “nutritionism”-based (to borrow Pollan’s term) supplements, megadose vitamins, and druglike extracts. Its remedies stem from plants. They are real, they grow out of the soil, and they are alive. As we explore these plants, it will be worth examining the folk traditions to see what they have to say—both to get some guidance on how to best employ the herbs and also to see if traditional applications resonate with our modern understanding. In so doing, we might get some new ideas about what health really means.

One of the key strengths of a traditional medical system is the simplicity of the preparations that are used. Sure, there are some exceptions—just as there are in cooking. But crafting a simple distillation apparatus to make herbal spirits is just about as complex as it gets and certainly requires neither a chemistry lab nor analytical tools. A good soufflé might actually be more difficult to execute (at least for me). This immediately makes such a system accessible to a wide range of folks. You can grow, or often find wild, many of the remedies you might need for simple home care. And after you harvest them, it is very easy to prepare them for use.*

First and foremost, herbal medicine is interwoven into cuisine itself. Thyme, often used to season fish and seafood, warms the digestion and improves the “feel” of the meal as we assimilate it. Chicken

*Full details are beyond the scope of this work. See *Rosemary Gladstar’s Herbal Recipes for Vibrant Health*.

soup with a lot of extra garlic supports the body when it's struggling with a respiratory infection. The roots of *Astragalus* and burdock, along with mushrooms, can be simmered into that same soup stock along with chicken bones and vegetables to promote resilience and help speed recovery from illness. And chocolate is divine taken hot in water, with a little local honey, and perhaps a pinch of cayenne pepper. Are these medicines or foods? Both! These few examples give us a feel for the role that medicinal plants have played in food preparation and should immediately give food lovers a new and exciting frontier to explore: recipes for our favorite dishes can be amended to include ingredients that have an application in keeping us healthy, vibrant, and inspired. Beyond that, it might be interesting to those who are passionate about their heirloom recipes to find that there is a strong physiological and medicinal basis for using the spices and combinations those recipes feature. It's not just about flavor.

Though I've been lucky enough to sample some tasty lemon balm-lavender cookies, these plants are usually reserved for another type of preparation that sits in the gray area between food and medicine—the infusion, or tea. More than just a beverage, tea can have profound effects when taken habitually, week after week.* This is another incredibly simple way to bring plants into your life. Herbs are harvested and dried, or purchased dry, and four or five tablespoons are steeped in a quart of hot water, covered, for anywhere from five minutes to five hours (it depends what you're going for). The infusion is then strained and taken with or without a little honey, hot or iced. Couldn't be easier—and many of the plants I'll explore in detail make delicious tea.

A more medicine-like preparation, though still quite simple, is the tincture. From the Latin *tingere*, meaning “to turn color” (the root of our word *tint*), it is simply an infusion that uses high-proof spirits instead of water. Herbs are steeped in 100 proof vodka and sealed

*One of my favorite arguments for the herbal infusion is from Susun Weed's *Healing Wise*. This book contains discussions for specific infusions throughout, but general thoughts start on page 261.

tightly in a mason jar for three or four weeks (herbalists usually wait one full cycle of the moon). Then they are strained out, the fluid is retained, and it is taken at doses that range from a few drops to a teaspoon or so. This is certainly a little closer to a pharmaceutical (and just one hundred years ago, that is precisely what it was). But these preparations still cross over into cuisine, primarily behind the bar, and we are starting to see them used in custom “medicinal” liqueurs and cocktails that claim to be useful for digestion, mental health, coughs and colds, and even spring allergies.*

All these simple ways of using plants can be incorporated into daily rituals that are performed in the kitchen. A drink before dinner may be custom-blended from a homegrown apothecary to suit the mood and complaints of the day. Afternoon tea may be a medicinal experience. And family meals can do more than simply nourish us with vibrant, local foods. With just a little attention to the recipe, they can help restore health and keep us well, using special ingredients that grow side by side with the tomatoes. It isn't hard to do, nor, as we shall see, is medicinal activity tied only to one rare, exotic, magical plant. There is broad crossover between species, and this fact leads us to one of the central arguments of this book: even if you only learn to use one of each kind of plant (an aromatic, a bitter, and a tonic), you will experience benefits. Though the full science and art of herbal medicine may be quite complex, it is also incredibly simple to get started and begin to see results.

Just as cuisine brings friends and family together and gathers threads of local food production, *terroir* (the unique flavor of the place where food is grown), and history, using herbal medicine opens up a relational view of health and well-being that ends up changing how we see the world. For example, it is hard to go back to store-bought produce once you've tasted a caprese salad made from your garden.

*Again, full details are beyond the scope of this book. See *Rosemary Gladstar's Herbal Recipes for Vibrant Health*. For a more recent take on the use of tinctures in medicinal cocktails, see Proville and Blunts', "Spring Medicinals."

Tomatoes still warm from the summer sun, hand-picked whole basil leaves, and thick slices of an almost-sweet, juicy, fresh mozzarella make all else pale by comparison. Experiencing this food makes you more mindful about future food choices, and once you've tasted homemade pasta dumplings in vegetable broth, it's hard to swallow the dehydrated, processed tortellini on the grocery store shelf. Similarly, once you've experienced better digestive health from the regular use of bitter plants, it starts to seem a little strange to use antacids, laxatives, or weird pink syrups to address the same symptoms.

Once you adopt a real food cuisine, your attitude toward food begins to change. How important then to start using medicine that is also based on traditional methods. There is a cultural (and biological) wisdom to these practices that has evolved over millennia to keep our day-to-day lives running smoothly. This wisdom also necessitates personal involvement, just as real food does. If we could get more involved in promoting our own health, the repercussions would be dramatic. I envision less stress on our overburdened primary care system; a greater range of preventive and curative strategies for the chronic diseases of modern life; and rich, abundant gardens where we cultivate both food and medicine. We can make this vision a reality by adopting strategies that are time-tested, often clinically studied, and effective. And instead of relying on “flavor-of-the-month” supplements, we can do it all using local, wild, easy-to-grow plants we've gotten to know personally—truly a cuisine for medicine.

WHAT KINDS OF PLANTS AND WHY— A SYSTEMS-BASED CONTEXT

Herbal medicine may have its strengths, but just because it's been around for thousands of years doesn't make it inherently valid. Certain examples come to mind—such as the use of kidney-toxic aristolochia²—which remind us that we can't just assume that traditional ways of doing things are automatically safe and effective. But my goal is not to

use herbalism as a starting point for our investigation of plants; rather, I hope to use it as a touchstone for putting some of the botanicals in the following pages into context.

All in all, aside from a few cases (some of which involve adulteration or inappropriate use), herbal medicine is extremely safe. As Simon Mills and Kerry Bone, English and Australian medical herbalists, respectively, note: “Considering the vast usage around the world of plants as medicines, it is remarkable that there is so little epidemiological or clinical evidence that this is a harmful activity.”³ Indeed. Beyond this, I have chosen the safest examples to explore in this book, with only one (wormwood) being contraindicated in pregnancy. All the others are extremely benign plants—so you can begin working with them, confident that they will cause no harm.

But what about the overall efficacy of plants as medicine? This is a more difficult question. In order to arrive at an answer, I propose to start with physiology. Plants, after all, are complex, living systems interacting with the complex living system of the human being. This interaction takes place at multiple levels and is difficult to quantify completely using the tools of modern biochemistry (such as drug-receptor effects, for instance). If we can organize human physiology into broad patterns, we can see if plants might have an impact by examining how they interact with those patterns. We would thereby try to answer the question of efficacy by taking a relationship-based approach. This makes sense for a system of medicine that is so akin to cuisine.

How can we even hope to describe a broad system whereby herbs relate to human physiology? The sheer number of chemicals in a single plant, let alone all the plants used as medicine, is overwhelming. The genetic instructions, enzymes, cellular processes, organic functions, and integrative pathways in the human being are equally complex and, in many cases, appear disorganized or disconnected to our limited understanding. So what to make of this vastness? Let’s start by examining an insight from Warren Weaver, a mathematician, scientist, and scholar of probability and complexity, writing in 1948.

What makes an evening primrose open when it does? Why does salt water fail to satisfy thirst? . . . What is the description of aging in biochemical terms? . . . [These] are all problems which involve dealing simultaneously with a sizable number of factors which are interrelated into an organic whole. They are all, in the language here proposed, problems of organized complexity.⁴

The system as a whole has an organization, a quality we can understand, that emerges from the interrelationship of its individual components. We may not fully grasp how each piece works, but that may not be absolutely necessary. This insight into how to understand complexity underpins a branch of scientific research now known as systems theory, which is essentially a study of reality based on broad patterns of interaction and interconnection in an ecosystem. Right around the same time, in the mid-twentieth century, Ludwig von Bertalanffy articulated the mathematical and theoretical underpinnings of systems theory as we know it today, in his classic paper titled “The Theory of Open Systems in Physics and Biology.”⁵

Theoretical physicist Fritjof Capra studied in Austria but has lived in Berkeley, California, for many years. The deep level of both interconnection and uncertainty evident in the world of subatomic physics led him to seek new ways of understanding; as a result, he has become one of the world’s leading systems thinkers. His articulation of systems theory is one of the clearest I have encountered. In essence, it describes a way of looking at a living ecology that allows us to more quickly grasp the important patterns of Weaver’s “organized complexity”: how to describe and predict its behavior without knowing all its individual parts. This is a departure from the driving thrust of human inquiry. Since we started using the scientific method, we’ve most often tried to break an ecosystem down into individual pieces to figure out how the whole works. In *The Web of Life*, Capra’s model of systems theory offers a different view.

First, a system shows what are called “emergent” properties, qualities

that cannot be predicted by its individual parts. We often refer to this quality in our daily experience as “synergy,” and that underscores the importance of taking a step back and looking at the broader system. Without doing so, we might miss key features.

Second, all systems have multiple levels of organization. A city, for example, has a pattern of daily activity, with its inhabitants moving around in predictable ways, inputs flowing in, and waste and heat flowing out. But an individual neighborhood has its own pulse, too. It has particular centers where the community gathers, hubs of activity. And, of course, a home is its own little system, both in terms of its structure and its inhabitants. Individuals are distinct ecologies, too. You get the idea—organization exists at both the macro and micro levels. This fact, coupled with the mathematical counterpart of fractal geometry, which shows that systems exhibit similar patterns of organization at all levels,⁶ comes together in the concept of holism: there exist complex, self-similar structures and relationships at all levels of life. When we look at life on a small scale, it looks and behaves in a remarkably similar fashion to life on a grand scale. This is actually a very old concept, though somewhat forgotten, perhaps best articulated by the hermetic philosophers. As rendered by Sir Isaac Newton, it goes something like this: “That which is below is like that which is above.”⁷

Third, as we saw with cuisine and herbal medicine, systems theory focuses on the relationship and connection between components of a system. As Capra puts it, “In systems science every structure is seen as the manifestation of underlying processes.”⁸ A city is what it is because of how its inhabitants organize themselves into neighborhoods and how those communities interact with one another, more than because of its buildings and streets. The literal shape and structure of its buildings and streets is a reflection of those patterns of interaction. This firmly shifts our understanding of urban ecosystems into a fluid concept of life, rather than an abstract, fixed framework. This is evident in new urban planning ideas. No longer do we segregate our living and working arrangements into separate districts: downtown, shopping

malls at highway exits, and residences in the suburbs. Mixed-use, walkable neighborhoods that focus on the patterns of daily life are now in vogue.⁹

One of the classic examples of systems-based thinking is the Gaia hypothesis, developed by James Lovelock and Lynn Margulis. In a seminal paper published in 1974, titled “Atmospheric Homeostasis by and for the Biosphere,” they advance the notion that “early after life began it acquired control of the planetary environment” (page 1)—truly a radical notion at the time! The argument that the long-term control of atmospheric oxygen and temperature is due to a global web of microbes and algae was hard to swallow. It implied that there is a greater and more powerful biological “organism” at work on planet Earth than the human being, and that our very survival is contingent on this being and its ongoing health. Drawing in part on systems theory, Lovelock and Margulis examined the gaseous composition of Earth’s atmosphere, going back billions of years,* and noted that levels of greenhouse gases (such as ammonia) fluctuated based on solar energy output in just the right ways to maintain conditions favorable for life.

Thus Gaia exemplifies the qualities of a complex, self-regulatory system as defined by Capra (and others). First, if taken as a whole, it has an emergent property. It can control atmospheric temperature and oxygen balance (not obvious when we examine its components—bacteria and blue-green algae). Second, it possesses multiple levels of organization, from the individual microbe and its cellular respiration to tidal pools, oceans, and the planet as a whole. Third, it is the response of the biological components to different temperatures and gas concentrations that truly defines the system, more than any absolute amount of either one. As ammonia and CO₂ levels go up, temperature rises and microbial metabolism decreases. This balance, this relationship, is the crucial point more than the bugs or the gases themselves.

*Lovelock’s previous research had focused largely on the complex soup of atmospheric gases and what we can learn from altering it. For instance, see Lovelock and Giffen’s “Planetary Atmospheres.”

Another interesting application of systems theory is in the field of economics, where it is used to analyze and explain events that at first blush might appear unrelated. Some of the more interesting examples were collected by Albert-László Barabási, a physicist and systems theorist who has worked at Notre Dame and Northeastern University. Barabási takes systems theory one step further by using mathematics to analyze the systems themselves, delving into the relationships between their components. His focus is on the network of connections between the components of a system, and his research uncovered an important characteristic of such life webs.¹⁰ Essentially, he proves that networks in systems like the living cell, ecosystems, cities, economies, and even the World Wide Web are characterized by a few, highly connected elements (“hubs”) and lots of pieces that have only one or two links (“outliers”).

Two interesting implications of this research relate to the global economy in recent years and how systems and networks function.* Right off the bat, it is easier for hubs to get “more”—more connections, more information, more resources. This process quickly snowballs. In our society, we see this embodied in a simple principle: the rich get richer. Not only do the rich control the vast majority of capital resources (they are hubs in the financial network, where the rest of us are outliers), their connections allow them to accumulate more resources at a much greater rate than everyone else.†

Additionally, a threat to a hub, which at first might seem to be of limited concern, can have much wider implications due to the high degree of interconnection the hub has with the rest of the network. A case in point is the bankruptcy of Lehman Brothers in September 2008. Here we have an extremely wealthy financial institution disappearing, essentially, from the ecology in which it was a major player. And while, rationally, one might have expected it to be dissolved in

*For details on network theory applied to economics, see Gabaix et al.’s “Theory of Power-Law Distributions.”

†As evidenced in the story of Vernon Jordan, retold in Barabási’s *Linked*, pages 202–4.

an organized fashion, exactly the opposite happened. Its collapse sufficiently disturbed the network to cause global repercussions in bankers' ability to move money and finance business. Immediate ramifications were felt from North America to Hong Kong. Long-term effects resonated for years across the financial markets worldwide.

As with Gaia, these are also examples of living systems. Economies behave in a complex fashion and display elements of synergy (witness, for instance, the corporate merger). They have self-similar (as above, so below) organization at all levels, from individual finance to families, corporations, sectors, and the world. And the importance of the connections over the components is clearly evident in events like the banking crisis of 2008. But when we look at these systems more closely, we see that they also exhibit the network characteristics described by Barabási. There are crucial hubs and, if something goes wrong—even if it seems like something small (a rumor on the stock exchange, say)—it reverberates throughout the network.

The point I want to make is that human physiology, which comprises the set of processes and functions that constitute the living human being, is a networklike system. It has all the characteristics of the open systems described by Weaver and von Bertalanffy. It has emergent qualities, such as consciousness (we still have no idea where that comes from);¹¹ it is broadly self-similar and highly organized at all levels, from the whole person to the individual cell; and it is all about the relationship between functional subsets, such as brain and heart, or liver and food. Most likely, physiology also demonstrates networklike behavior, where certain hubs are more connected than others. And, as is the case with nature itself, it exhibits characteristics of all living systems: spontaneous “breakthroughs” into new levels of complex emergent properties (so evident, I feel, in the development of young human beings) and sensitivity to small, habitual, insidious perturbations (such as those from diet).*

*Capra summarizes this well in *The Web of Life*, pages 192–93.

Some physicians and researchers have already begun to develop models of the human being as a system, seeking to address disease by looking at processes and patterns of activity, rather than the static anatomy of the body. One example is put out by the Institute for Functional Medicine.¹² It stresses the importance of identifying the context in which the patient lives, the processes (such as assimilation and metabolism, defense and repair, and communication between subsets of the system) that take place, and “personalizing factors” (such as sleep, exercise, nutrition, and relationships) that modify the way the processes behave. From these factors, we can see some disease as emergent qualities of a complex system, and attempt to intervene using gentler “perturbations” that might have safer, longer-lasting results.

Of course, one need not look to twenty-first-century science to find a description of the human being that relies on function and broad patterns of activity, rather than a dissection of our anatomical components. This has, in fact, been the language of traditional medicine all along. It speaks of moisture and dryness, of a fire in the belly both burning our food for energy and circulating vitality through our core, of tension and tone across multiple organ systems, of ecological context. This is a language of weather, of seasons, of flux and change. It speaks in allegories that may actually be amazingly accurate descriptions of process-based emergent qualities in the organized chaos we call life. And, crucially, it proposes an idea that is absent from a system of medicine based on disease analysis: that health, and life, can be fostered, encouraged. Through this lens, well-being is not a state that exists in the negative, occurring once all disease is removed. Rather, well-being is the result of positive nourishment. It is something we can, and should, work to create.

THREE KEY PHYSIOLOGICAL “HUBS”

If the human being comprises a networklike system, what are its crucial nodes? Traditional systems of physiology have some interesting notions.

For instance, the Galenic four humors, based on Hippocratic ideas and evolving into four “temperaments,”¹³ are energies, or states of being, that can commingle and whose balance affects personality and physiology. Similar fluid- or energy-based models are also used in Ayurveda, a system of healing from the Indian subcontinent.¹⁴ Paracelsian alchemy reduces life to three basic processes: the sulfur, a kind of personality/soul; the salt, our physical organs, muscle, bone, and sinew; and the mercury, the common thread uniting the whole. There are numerous animist healing practices around the world that rely on spiritual powers being present in places, plants, waters, and more—and through their interactions, fostering well-being.* And classical Chinese medicine relies on five processes, which also represent states of change, to summarize the human system.¹⁵

What’s most intriguing to me is that we can even devise such a simple way of viewing the human being. After all, medical understanding is extremely broad and deep, and superficial knowledge can be extremely dangerous. You have to know how all the details interact before you can proceed safely. The complexity of physiology makes it seem unapproachable to the layperson.

Yet perhaps this isn’t really the case. There are a few problems with the whole notion. The first issue is that we will never know *all* the details of human physiology. Wide areas of understanding, ranging from consciousness and thought to the expression and regulation of our genome, are still elusive. No matter how complex the description, it will always remain incomplete. Traditional, systems-based understandings aren’t any simpler (lifetimes are spent on the details, just as in biomedicine), they just have a better-characterized top-level network. The second issue is that danger only seems to arise when you take a single, isolated substance and apply it at a specific level of the physiological system. Traditional herbal medicine has never had this option (aside from a few well-known poisons, of course). It has always

*For an ethnobotanical overview of many of these traditions, see Grossinger’s *Planet Medicine*.

employed complex chemical cocktails (i.e., plants) to treat the complexity of human physiology. Could this be part of the reason behind its safety? Ironically, the tools of biomedicine might be more dangerous because they get *too* deep into a piece of the network.

To illustrate, consider the example of the yohimbe tree, *Pausinystalia yohimbe*, which grows in West Africa. Its bark is traditionally used as an aphrodisiac, and an alkaloid it contains, yohimbine, has been extensively researched clinically and found to be quite effective.¹⁶ It works by dilating the arteries and improving blood flow to erectile tissue—but biomedicine clearly warns us that it also “turns off the brakes” on our adrenaline response. Under the right circumstances, this might raise heart rate and blood pressure. This could be dangerous in someone with heart disease—and you’d never be aware of this fact unless you took the time to understand “the nature of the hypothalamic response to alpha-2-receptor antagonism.” This, at least, is the basic argument.

Traditional herbal medicine has a two interesting responses, and both show systems thinking at work. First, you’d be unlikely to give someone yohimbe if he already had heart disease, even without knowing anything about alkaloids, receptors, or blood pressure. The medicine from the yohimbe tree, so the story goes, is like an August afternoon—hot, potentially oppressive, sweaty.¹⁷ It’s not going to mix well with a person who is red, maybe angry, overstressed, with a fast and full pulse. You might choose a range of other aphrodisiacs, thus avoiding any potential danger, thanks to a crude, energy-based assessment of the situation. Second, even if you did decide to use yohimbe (some people with high blood pressure are cool, quiet, and have weak pulses—though in my experience such an individual is rare), it would be administered as a whole plant, not as the isolated constituent. The bark you’d use has a wide range of other chemicals in it, including the alkaloid ajmaline,¹⁸ which reduces high blood pressure while calming and steadying the heartbeat.¹⁹ I’m not trying to say that all plants are danger-free, though, certainly, the vast majority are. This example just

serves to illustrate how using systems theory in our approach to physiology and treatment might uncover useful, safe, and—most important—understandable methods.

Now, rather than borrowing a traditional system for our exploration of how to define a “cuisine for medicine,” I’d like to take what we’ve learned from our exploration of systems theory, networks, and their applicability to health and come up with a very basic, top-level organization for biomedicine. Once we have a solid but straightforward framework in place, we can assess how medicinal plants fit in to the modern perspective on physiology. It comes down to this: we need a simple network that describes Western physiology (and pathology) in crude enough terms so that we can begin to see how a crude plant might fit into it. And what we’ll find, ultimately, is that looking at the kinds of plants people have always used frames the physiology fairly well. System to system, we can tame complexity and reveal useful information along the way.

The first hub in our physiological network is the ongoing balancing act known as *neuromuscular tone*. This refers to the collection of processes that occur in our body and mind and relate to how tight our muscles are and how active our mind is. Too tight, and we literally get tension, spasm, blockage, and poor circulation. Too loose, and we have sluggishness, fatigue, and poor motor and mental response. Interestingly, because nerves from the body connect to the brain, tension and laxity are reflected in the mind as well—producing anxiety in the former case and depression in the latter.

I propose that, when taken as a whole, the nerves and muscles of the body act as a sort of “pacemaker” of activity, helping us respond effectively to the world’s changes by adjusting internal tension as needed. Making sure this hub is functioning well is extremely important. Not only does an imbalance in neuromuscular activity impact physical tension and mental health, but through our hormonal system it exacerbates chronic pain, poor digestive function, blood pressure

disorders, and heart disease. And we can all relate to how powerfully our mood plays into everything we experience.

Neuromuscular tension is, ultimately, about how we deal with stress. How we process and internalize stress ultimately makes the difference in how we feel. Exercise may be the best intervention for rebalancing this hub of physiological activity—it improves mental health but also addresses cardiovascular disease.²⁰ Additionally, key botanicals can play an important role as well. The hope is that by addressing the level of tension in our body and mind, we can buffer the impact of stress on our physiology, and perhaps reduce our reliance on antidepressants, anti-anxiety drugs, stimulants, and sedatives, the use of which has become so pervasive in our society.

The second hub in the physiological network is digestive and metabolic activity—the combined set of processes that deliver nutrition and energy from what we eat to our cells. There are many components to this hub, starting with digestion but involving other organ systems along the way—most notably the liver and the pancreas, key chemical processing centers and balancers of blood sugar. We will find that there are important connections between all these constituent parts and that the whole process of digestion, absorption, and metabolism weakens other areas when it's not functioning well. For instance, big swings in blood sugar figure prominently in type 2 diabetes; elevated blood sugar levels lead to inflammation in blood vessels and cause premature hardening and dysfunction of our arteries.²¹

I propose that what has been called *metabolic syndrome*—a combination of high blood pressure, obesity, and diabetes²²—is an imbalance in the function of this physiological hub and that the imbalance begins in the digestive system, its rate of movement, and its secretions. It continues in and is perpetuated by dysfunction in the liver and pancreas. Obviously, dietary modification is the key intervention in this area, and here the efforts of Pollan as well as chefs like Alice Waters of Chez Panisse in Berkeley, California, have helped enormously. There is also an important and storied class of plants that positively affects all

the elements of digestion, absorption, and metabolism. Here, we will see how everyday digestive complaints (for which modern medicine has little to offer) and blood sugar imbalance are buffered by botanical medicines. They can allow us to live in a more toxic world, surrounded by petrochemicals and processed foods, without our physiology suffering. As a result, good food and some key plants might reduce the massive impact that metabolic syndrome has on primary care in this country—all in the context of the kitchen.

The third and final hub in our physiological network is a bit harder to describe, as it involves functions and activities taking place in each cell of our body. In essence, it is the collection of processes that takes our genetic instructions (encoded in DNA) and turns them into reality. We are becoming increasingly aware that our genetic blueprint is by no means set in stone. Rather, its translation into the phenotype (our physical structure and, by extension, all the emergent properties that come with it) is quite flexible and intimately connected to the surrounding environment.

This hub of the network, though evident at a smaller scale, has the most profound and wide-ranging macroscopic impacts. Most notably, the regulation of gene expression ties in closely to immune activity and inflammation, key components in the etiology of cancer but also the perpetuation (or resolution) of chronic inflammatory diseases. Tissues, made of cells, respond as a whole and behave according to how each cell behaves—so alterations in gene expression are visible in such disparate organs as respiratory mucous membranes, bone marrow, and the brain. Again, diet plays a key role in balancing this hub, too, but the dietary elements that seem to be involved appear to come from more wild plants than, say, potatoes or tomatoes. Chemicals, such as bioflavonoids and other polyphenols, are getting a lot of attention as regulators of gene expression, and they are abundant in medicinal herbs.

By examining these botanicals, we will find a deep connection with the natural world that reverberates through our entire physiology, from the tissue to the cellular nucleus (and probably beyond—we just haven't

explored those levels yet). The hope here is that their reintroduction will lower cancer rates, address immune dysfunction, and minimize the impact of chronic inflammatory disease (from “simple” ailments, such as osteoarthritis, to more complex conditions, like lupus). These plants resonate through our history as a clear tone rings through an open space, and bringing them back into our lives may be one of the best ways to deal with (or prevent) the mysterious ailments that continue to haunt us, and for which modern medicine has, at best, palliative drugs and, at worst, outright poisons.

How can we be sure that these three “hubs”—neuromuscular tone, digestive/metabolic activity, and genetic expression—are truly a comprehensive enough “top-level” description of the human physiological network? In a practical sense, the answer to this question makes no difference. If anyone could propose a viable system that would positively impact stress and mood, diabetes and metabolic syndrome, cancer, and chronic inflammatory disease, then I would respond with a resounding “Let’s get started!”

Taken together, these diseases have a huge impact on modern productivity and quality of life. They are also the areas where modern medicine, despite its stunning successes elsewhere, has fallen short—which is not surprising, given how hyperspecialized the discipline has become. We are ready for new (or is it old?) ideas to come into play.

These three hubs cover most of the areas of health that a layperson could hope to treat safely at home. Massive infection—forget about it. Broken bones—take me to the emergency room. Kidney disease and pneumonia—though a skilled herbalist might have something to offer, both of these are relatively rare conditions nowadays, and areas where modern medicine excels. Given how strongly immunity and inflammation figure in all disease processes, adjusting the function of our third metabolic hub might help in these more dire cases, too. One final area that may be an exception is fertility and reproductive health. There are interesting options in traditional plant-based healing modalities that might have a role to play here as well. I do not address them spe-

cifically, not only to maintain simplicity and clarity, but also because the rebalancing of our second hub—metabolic function (vis-à-vis the liver)—affects reproductive hormone status. If you are interested, there are numerous resources available.*

This simple, three-part network provides a way to understand and relate to physiology that is accessible and practical, and one with which we can all identify because we see and feel its effects daily. Additionally, it offers a context within which we can assess the effectiveness of traditional plant remedies by highlighting their strengths: systems interacting with systems. So, in the end, the case to be made is that these plants, which are simple to grow and prepare and yet quite complex in their nature, can affect these three physiological hubs in powerful, predictable, and consistent ways. I hope to show you that such a case can successfully be made, and that the implications underscore the importance of bringing traditional medicine back into the cultural mainstream in order to cope with the vicissitudes of modern life.

Taking up our wild weeds, let us walk into the field and forest together, mindful that, when we return to our homes and communities, we will be changed, more entangled, more infused with the green blood of our botanical companions. What this will do to our culture I cannot predict, but I hold great hope that the benefits far outweigh the risks.

*Among the best are DeLuca's *Botanica Erotica* and Green's *The Male Herbal*.