AN EXCERPT FROM

THE ROLE OF AUTONOMICS IN THE ORIGIN AND HEALING OF CHRONIC ILLNESS

NATUREZA GABRIEL

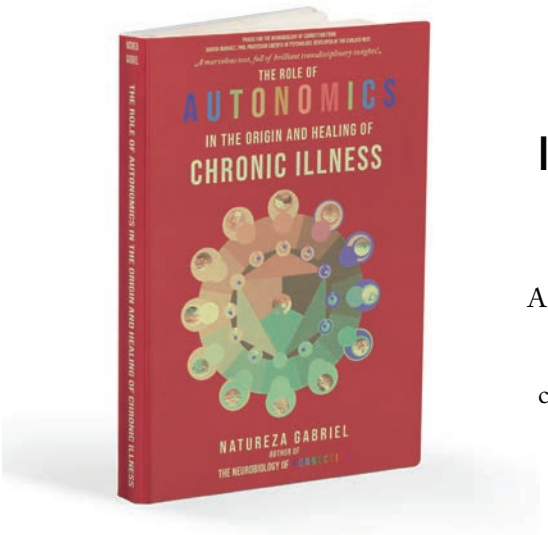
AUTHOR OF THE NEUROBIOLOGY OF CONNECTION

ABOUT GABRIEL KRAM

Gabriel Kram (Natureza Gabriel) works at the interface between neuroscience and ancestral awareness. He is a connection phenomenologist, neural cartographer, and performance neurologist trained by many of the world's leading experts in connection and wellbeing and by Indigenous trackers and wisdomkeepers. His efforts are aimed at finding synergies between these perspectives and helping humans live from the ancestral baseline in safety & connection.

He has spent nearly thirty years completely rebuilding a living cartography of the Autonomic Nervous System that rewrites a significant part of the lineage history of neuroscience, the foundation model of which was reduced to practice in June of 2024.

He is Founder of Hearth Science, Inc. and has been asked to teach the modality he has been developing for 30 years with more than 100 mentors to the entire faculty of the Stanford University School of Medicine, Extinction Rebellion, Indigenous tribal leaders, and some of the world's leading executive coaching and leadership development firms.



Following is an excerpt from

THE ROLE OF AUTONOMICS IN THE ORIGIN AND HEALING OF CHRONIC ILLNESS

A handbook exploring how autonomic lifethreat responses learned unconsciously in childhood can create the deepest neurological strata of chronic illness (its origins), and what we can do about this (healing).

www.hearthscience.io

A NOTE FOR READERS

This handbook is part of a series on the application of Autonomics to our lives.

The first handbook in the series, *Autonomic Compass*, lays the general groundwork for understanding core concepts of Autonomics, including what the Autonomic Nervous System is, neuroception, what autonomic states are, and the basic neurology and neurochemistry of autonomic systems. In this volume, we look specifically at the application of the framework to chronic illness.

Because I don't wish to re-write foundation material that I have covered in-depth elsewhere, I direct you to that other volume for a general overview.

If you would like to read the core pedagogy of Autonomics, rather than or in addition to focusing on its application, I direct you to the Autonomics Trilogy: *The Neurobiology of Connection*, *Ground*, and *Body as Verb*.

Warmly,
Gabriel

GLOSSARY

Appease: a defensive autonomic state characterized by responding to a threat using elements of social neurology (Connection System) and social neurochemistry.

Autonomic State: An energy-processing template of the Autonomic Nervous System (ANS) that governs how experience flows through and across our bodymind.

Connection System: One of the three foundational autonomic neurological systems, the Connection System is the most recently evolved of our core autonomic systems. In the presence of a felt sense of safety, the Connection System unites the neural regulation of the face, voice, eyes, the tuning of the middle ear, and the hands with the heart and breath, allowing us to come into attuned connection with another. The Connection System undergirds salugenic (health-creating) autonomic states. For students of Polyvagal Theory, this is known as the Social Engagement or Ventral Vagal System.

Grounding System: One of the three foundational autonomic neurological systems, the Grounding System is the most ancient of our core autonomic systems. This system is organized through the unmyelinated sub-diagrphagmatic Vagus, and located primarily between the bottom of the rib cage and the pelvic floor. This system, under the chemistries of life-threat (endogenous opioids) undergirds autonomic shutdown responses, which are always implicated in chronic illness, via interface with the immune and endocrine systems. For students of Polyvagal Theory, this is known as the Dorsal Vagal System, although Polyvagal Theory fails to understand the role of this system in health-creation.

Interoception: The Mother of all senses, interoception is our

ability to feel ourselves from inside. I'm calling it the Mother of All Senses, because the Autonomic Nervous System can co-operate with, or co-opt all of your extero-senses (vision, hearing, smell, taste, touch) and put them in service to the ANS.

Neuroception: the moment-to-moment neural detection of safety, danger, or lifethreat by the embodied nervous system

Movement System: One of the three foundational autonomic neurological systems, the Movement System evolved with the vertebrate body plan. It places the autonomous motor control of appendages close to the specific limb, in Central Pattern Generators (CPGs) located in a series of post-synaptic ganglia running up and down the spine. It also includes brainstem CPGs that regulate sucking, swallowing, and breathing, as well as components of the vestibular and ocular systems required to sense the location of the body in space. This system, under the chemistries of danger (adrenaline and cortisol) undergirds autonomic fight-or-flight responses, and is called the Sympathetic Nervous System in orthodox neurology, although this naming fails to recognize the role of the system in health-creating states.

Placate: A defensive autonomic state characterized by responding to a lifethreat using elements of social neurology (Connection System) and social neurochemistry. A core autonomic pattern in chronic illness.

SIMPLIFIED ILLUSTRATION OF THE THREE PRIMARY AUTONOMIC SYSTEMS

CONNECTION SYSTEM IN BLUE

MOVEMENT SYSTEM IN YELLOW

GROUNDING SYSTEM IN RED

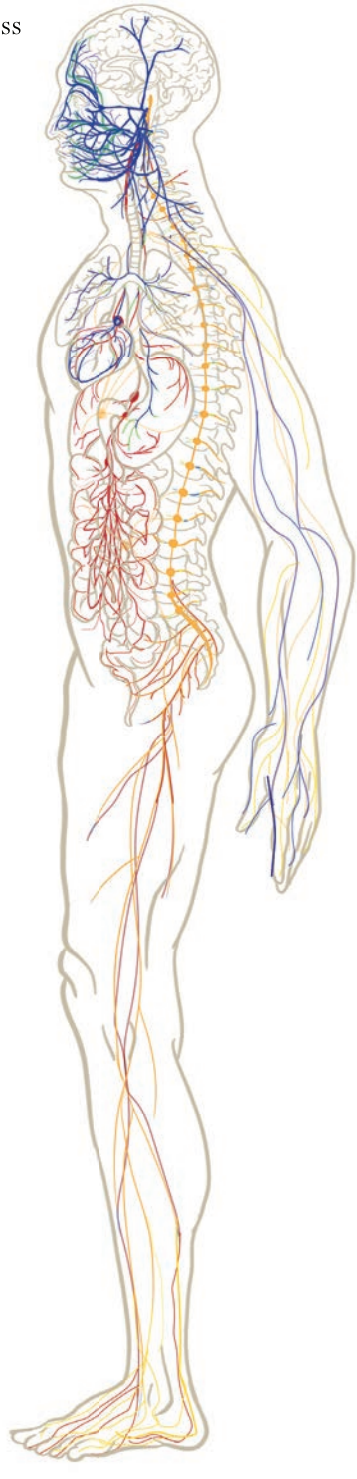
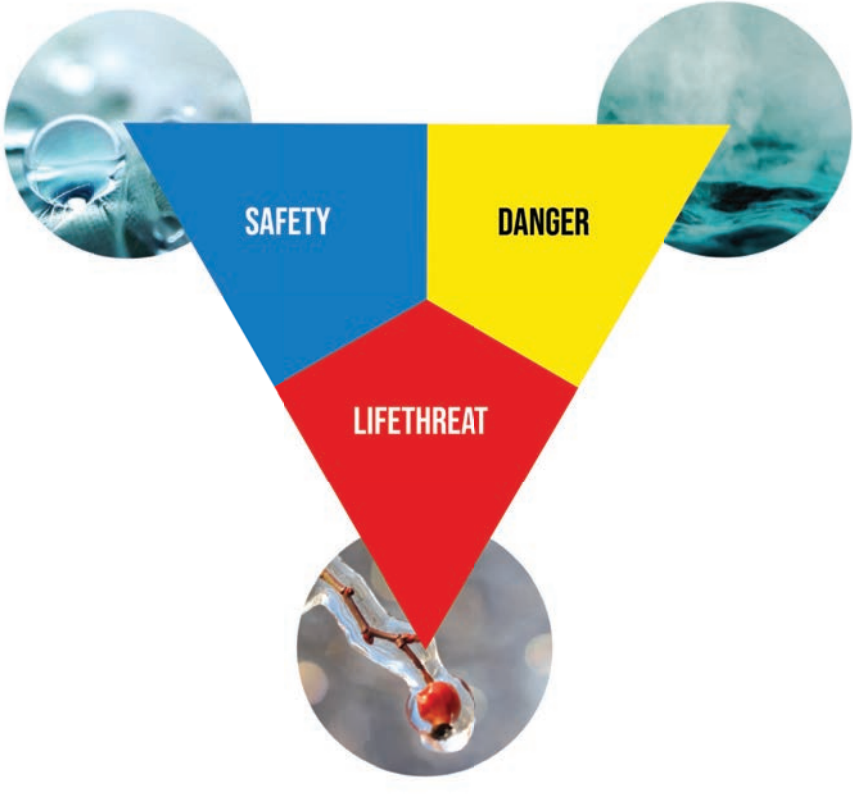
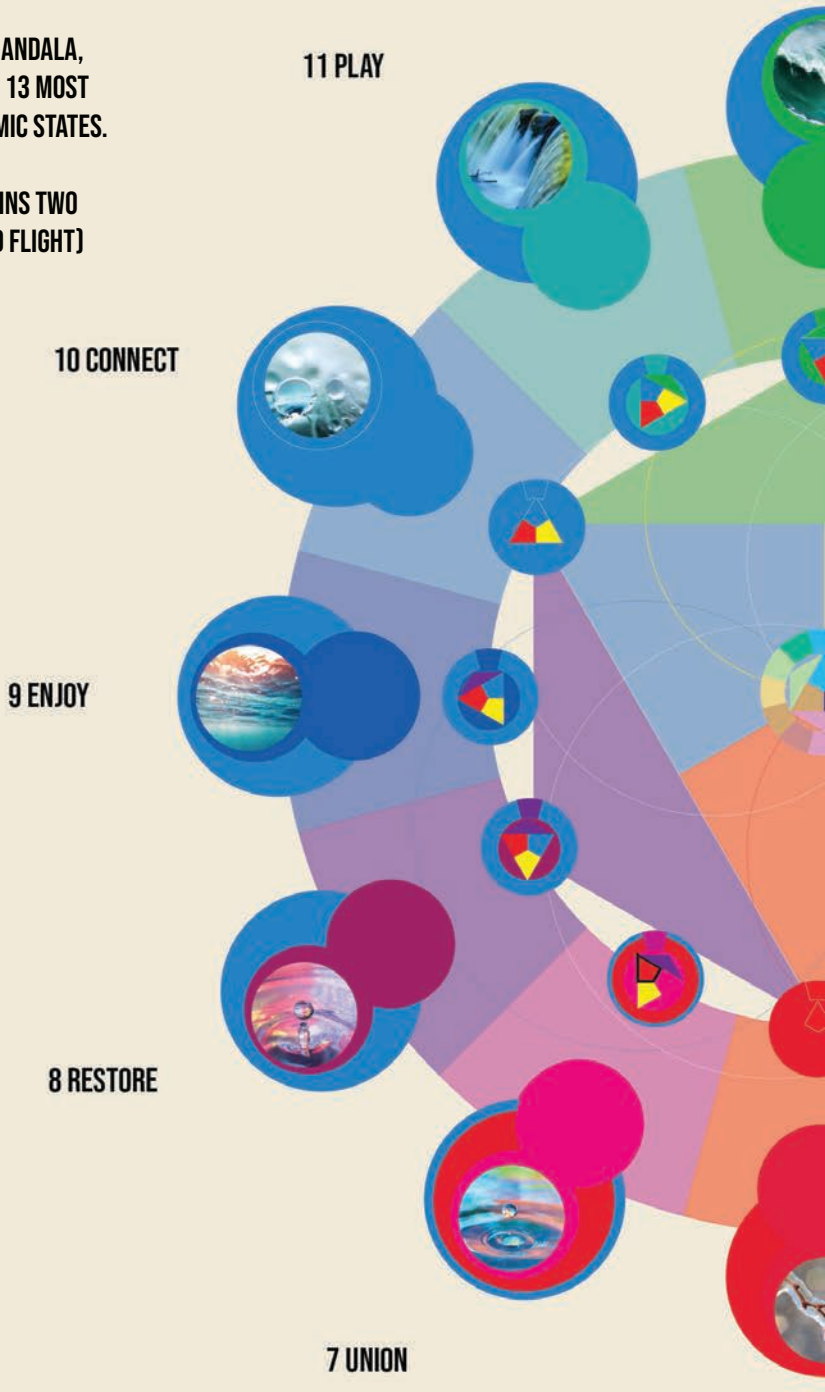


ILLUSTRATION OF THE THREE PRIMARY NEUROCEPTIONS OF SAFETY, DANGER, AND LIFETHREAT, WITH THEIR CORRELATION TO STATES OF LIQUID WATER, STEAM, AND ICE.



THE AUTONOMIC MANDALA, ILLUSTRATING THE 13 MOST COMMON AUTONOMIC STATES.

(3 O'CLOCK CONTAINS TWO STATES: FIGHT AND FLIGHT)



HEALTH CREATING STATES FROM 8 TO 12 O'CLOCK. DANGER STATES FROM 2 TO 3 O'CLOCK, LIFETHREAT STATES FROM 4 TO 6 O'CLOCK. 1 AND 7 O'CLOCK CAN BE HEALTH CREATING OR DISEASE CREATING DEPENDING ON CONTEXT

INTRODUCTION

The diagnosis and treatment of complex chronic illness is an art as much as it is a science. Chronic illness develops as the complex non-linear interaction of numerous physiological systems, including the neurological, immune, and endocrine.

It is often pre-conditioned by early life and adverse childhood experiences, yet can ultimately emerge in response to either endogenous or exogenous factors.

People can develop chronic illness as a result of exposure to environmental chemistry (toxicity), mold, or tick-borne illness. It can develop as the result of a virus (e.g. COVID-19) or other kind of infection. It can develop in the wake of a life change that is unduly stressful, a breakup, or the loss of a loved one. Two people may have identical exposures, living for example in a house with a mold problem, and one person may develop chronic illness while the other is unaffected.

This book is therefore but a piece in a larger puzzle. No one with chronic illness develops it without their Autonomic Nervous System (ANS) playing a causal role. It is not always *THE* primary cause, but it is always implicated in some way, because the Autonomic Nervous System governs the energy processing templates through which our experience flows, and ***complex chronic illness is both a cause and a result of sustained experiences of lifethreat***.

If you have some form of complex chronic illness, and you are reading this book, you are likely aware of the degree to which mainstream allopathic medicine will have difficulty making sense of your experience. Allopathic medicine's conceptualization of disease is quite mechanistic. It still views the various organ systems in the body as being akin to the parts of a car. It then has specialists (cardiologists, neurologists, gastro-enterologists) that work on these various parts. This divide-and-

conquer approach, which is of imperial origin, is ill-suited to any stress-related disorder or injury, for the simple reason that the systems that mediate the stress response are mind-body systems. The Autonomic Nervous System, which is the neural architecture of the mind-body connection, governs the organ function of ***all physiological systems*** based on our moment-to-moment detection of safety, danger, or lifethreat.

You can have a problem in your guts, and the gastro-enterologist can be looking very intently at this organ and diagnosing its dysfunction, as manifest through digestive difficulties, disrupted peristaltic rhythm, altered gut PH, and changes to the microbiome. But what your gastro-enterologist does not understand, and is not looking at, is that often the issues in the gut did not originate in the gut, but in the *neural regulation* of the gut. In plain language, your Autonomic Nervous System turned off your guts. And this means that the switch for turning them back on is not in your guts, even if your primary symptoms reside there.

Chronic illness, furthermore, is not simply a feature of the Autonomic Nervous System, but rather develops in the interactions between your immune system, nervous system, and endocrine system. Modern medicine and science understand very little about the immune system.

Bob Naviaux MD PhD, a pioneer in mitochondrial medicine who runs the Naviaux Lab at the University of California San Diego, recently conducted a set of tests on adults with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) and measured the presence of 500 molecules in their blood.[1] While 25% of the molecular signatures of the disease overlap between people who have it, 75% of the molecular signatures do not. This is to say that even among people who have the same chronic illness, in this case ME/CFS, the actual metabolomics of the disease are quite individual and varied.

1 https://naviauxlab.ucsd.edu/science-item/chronic-fatigue-syndrome-research/

If you have chronic illness, you don't really have a *category* of illness. You have your own unique illness with its own unique molecular expresssion. Every chronic illness is an N of 1. While this is profoundly, and sometimes endlessly frustrating, it means that in order to heal you must be actively engaged in the detective work of unraveling the illness. As the person living in the body with the illness, you are the most expertly positioned to engage in sense-making around it. You know how it feels to be in your body. You are aware of when you feel better, and when you feel worse, and the particular patterns of symptoms. No one else in the world, no matter howsoever expert they might be, approaches your level of direct experience of what is happening.

In order to participate actively in your own healing, it is useful to understand the various physiological systems involved, and what I'll try to do in this handbook is give you a sense of how the Autonomic Nervous System functions (or rather how its functioning degrades) in chronic illness, and some of the fundamental patterns we have noticed in working with patients and clients with chronic illness, as well as assisting and consulting with other practitioners serving these populations. What I am going to focus on here, ultimately, is the degree to which chronic illness is a manifestation of specific defensive patterns of relating. When we develop chronic illness, we get very focused on what is happening *inside* the body. Yet the genesis of chronic illness is almost always traceable to what happens *between* bodies, in the autonomic habits of our relating to others. This is an important reframe in understanding where and how we can intervene with ourselves to move back in the direction of wellbeing. ***The symptoms of chronic illness are inside us, but the levers that drive it are between us.***

As you work in the direction of healing, something else to bear in mind is that while it is likely important to address a number of different aspects of the illness in the movement towards healing, the order in which you address different components

matters. At some point along your healing pathway you will likely be dealing with infections/ co-infections, inflammatory responses, the gut microbiome, the Autonomic Nervous System, and how your attention works. Each of these are facets of the total experience. Yet you have to find a sequence of addressing these facets that your body responds to. Attention training doesn't work effectively if you have brain fog, or if the distress signals from the body are too strong. It is very difficult, and probably not useful, to try to learn to meditate if you are experiencing acute anxiety.

So as you work with the different facets of your healing process, if something is not yeilding results, move on to something else. It may not be that the area you are working on is not relevant: it may simply be that the timing is not right. This logic clearly holds for this book. For some of you reading it, this will be a timely piece, the next piece, of the puzzle. For some of you reading this, the information it contains will be helpful at some point in the future. If it doesn't resonate, just set it down. It may at some point in the future.

Finally, I would like to confess that I'm not really qualified to write this. I'm not saying that to be humble, but rather because it is true. While I am profoundly expert in the Autonomic Nervous System, I am not profoundly expert in the treatment of chronic illness. I happen to have had the experience of sucessfully transforming chronic illness in myself many years ago, so I can stand on the ground of this lived experience. And I happen to be in regular conversation with several brilliant colleagues who are deeply expert in the treatment of complex chronic illness.

This book arose out of a call-and-response dialogue with one of them. I would not have taken the time to write it if I didn't think it would be at least a little bit useful to some people. That said, this volume is provisional at best: a mere sketch. I confess that part of my hope in getting these notes down is that this will spur my colleague to writing a much more comprehensive

treatment of the topic himself.

I know from experience that one of the most psychologically challenging aspects of chronic illness is the slow pace of healing. I think it is important to remember that these illness typically develop over decades. They often trace back to our earliest childhood patterns of relating to caregivers. So while the onset of symptoms can feel sudden and suprising, their genesis is actually of an extremely long duration. I find this important in calibrating our expectations about healing. Part of the challenge in learning to heal is to help your bodymind re-write the scripts of how it responds to threatening experience. And this transformation does not happen in our thinking, but rather deeper down in the body, and deeper down in the nervous system. You are learning to retrain the deeper animal, and in order to do this you have to learn to communicate with these deeper parts of self in the language that they speak.

In our work at Hearth Science we call this developing *autonomic fluency*. It is, truthfully, learning a new language of the felt. This language is also, paradoxically, very ancient. This language is inward (interoceptive to be precise), and it is infinitely nuanced: the primal meaning-making language of the body. To become aware of it will put you into contact with the very depths of Self. Healing is, therefore, a journey of self-discovery, and a journey of transformation.

I therefore wish you patience, and I wish you flourishing vitality. May you feel the deepest sense of safety; may you find and unlock the doors that open upon your own deep wellsprings of wellbeing.

Natureza Gabriel
Founder, Hearth Science
25 April 2025

PART ONE: FOUNDATIONS

01- SAN RAFAEL

In the spring of 2024, Bob Naviaux, who runs the mitochondrial cell laboratory at the University of California San Diego introduced me to Dr. Eric Gordon, a functional medicine doctor who specializes in treating complex chronic illness. Bob, who is one of the world's leading practitioners of mitochondrial medicine made this introduction after a long conversation we had about the role of autonomic physiology in the origin and progression of chronic illness. Over the last several years, he had been writing about a phenomenon called the Cell Danger Response, a kind of localized cellular response in the body that in many ways mimics autonomic danger responses that happen systemically. In this response, cells at the site of an injury or wound begin dumping Adenosine Triphosphate (ATP) which is ordinarily used as their primary fuel, into the extra-cellular matrix, where it becomes toxic.

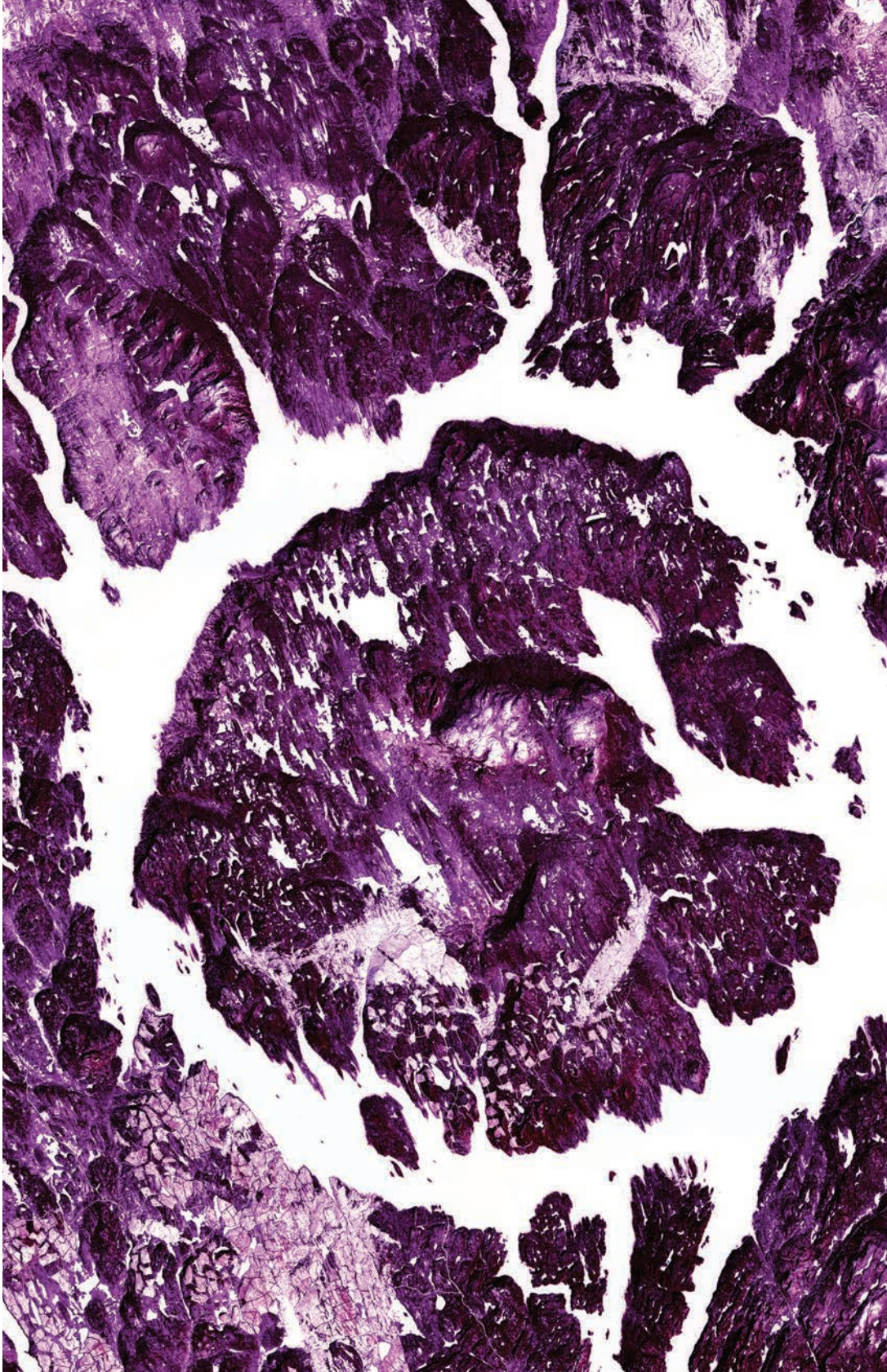
Mitochondria are our cellular engines. Once upon a time, these tiny organelles were other organisms entirely: several billion years ago early single-celled eukaryotic creatures developed a symbiotic relationship with them that has led to one of the most enduring marriages fundamental to the flourishing of life. The cells provided an ideal home for the mitochondria; in exchange the mitochondria power our cells. These tiny engines run on ATP, which is a primary energy currency for metabolic processes, powering the contraction of muscles, the propagation of nerve impulses, and various kinds of chemical synthesis.

The Cell Danger Response that Bob has noted and studied is

perplexing, because when it happens cells take this precious fuel and start dumping it overboard. Intriguingly, outside of the context of the cell, this fuel is toxic, and one of the strange effects of this now extra-cellular ATP (e-ATP) is that it creates a sort of local rogue island around the site of injury that becomes unresponsive to signals of safety from the Central Nervous System: a very unusual effect.

When he told me this story for the first time, I imagined a motorboat and cans of gasoline. I know this is probably not a perfect analogy, but I remember filling boat motors as a kid, and that if you were not careful, sometimes an irridescent sheen of gas would dribble out of the motor and end up on the water. I always felt slightly sick when this happened. Inside the motor, the fuel would power the engine. Outside of the motor, this prismatic sheen of fuel would poison the water. When Bob explained the response to me, this is what I thought of. We are mostly water; more than 70%. Our body is in many ways an inward ocean, and I could see how this response would diffuse into a local area in the body, spreading away from the injured site.

I have spent the past 30 years studying the human nervous system, and the past fifteen focused exclusively on developing a new living model of autonomic physiology called Autonomics. As Bob described the Cell Danger Response, I felt the hair on my arms begin to stand up. It was as though he was describing a tiny fractal of processes of autonomic physiology I had been studying, writing about, and working with clinically for years. A fractal is a mathematical figure that is similar at varying levels of scale. Even if you've never heard this word, you know what a fractal is. Have you ever looked closely at the pattern of run-off from a puddle? And then have you ever been in an airplane and looked down at a river delta from altitude? They create the same patterns. Nature speaks in a pattern language, and the patterns hold true at different scales, from the minute to the immense. The branching of certain trees has the same structure as the branching of the vascular system in your body;



the spiral of a chambered nautilus maps to the geometry of a sunflower which can also be found in the shape of the swirling arm of a galaxy. As Bob described the response I found myself once again in awe of the majesty and mystery of the human body as an expression of the design language of Nature.

The Autonomic Nervous System in the body works in ways similar to the Cell Danger Response. When we are in a salugenic, or health-creating state, the Autonomic Nervous System orchestrates a profound harmonization of our three primary autonomic systems coordinated around the rhythmic pulse of safety, producing the deep neural foundations of wellbeing. But if the Autonomic Nervous System gets shifted into enduring danger or lifethreat responses, and is unable to shift out of them, there are clear and repeatable neurobiological sequelae of this shift that resemble the Cell Danger Response. Absent the coordinating pulse of safety, autonomic systems stop functioning, or go rogue. Digestion stops working properly, and food that before nourished us can become toxic, just like the ATP. As this process unfolds, the immune system gets involved, pathogens are no longer deflected, co-occuring infections flare, and on and on, creating and intensifying the conditions for complex chronic illness.

At the end of our call Bob said, *I want to introduce you to a colleague of mine who is very gifted at treating complex chronic illness*.

Amazing, I said. *Does he live in the United States?*

It's a little town in Northern California, Bob said. *I think it is called San Rafael.*

That's funny, I said. Because I live in San Rafael. And that was how I met Dr. Eric Gordon.

02- TAKE TWO

Eric and I zoomed shortly after Bob's introduction, and met face-to-face for the first time on a spring afternoon in Nicasio, California, where I steward a forest. Meeting someone in a forest for the first time is great, because there is no clock on the wall. You sit outside together, the light filters through the trees and slowly changes as the sun makes its way across the sky, the birds sing, nature does its thing and you get to know someone outside of the tight strictures of the daily calendar that tells us we have a meeting at the top of the hour. Eric and I proceeded to have a series of conversations, about wellbeing and illness, about the Autonomic Nervous System and the immune system, about the difference between indigenous cosmovisions and modern cosmovisions, and then he started referring patients to me.

I think he would probably agree that this was not a great experience for either of us. Initially, Eric didn't know how to explain to his patients what I was doing, which created a situation where they would arrive and think we were having a long conversation when I was, in fact, taking precise histories and working with them autonomically. Sometimes a couple of hours into this, they would ask me when we were going to start, at which point they would be surprised to learn that they had already been paying my consultation rate for several hours. Not ideal. For me there was another problem, which is that Eric's patients were all very autonomically unwell. Because the way that I diagnose is largely felt, being around this level of autonomic dysregulation tended to make me feel sick for 24 hours after meeting with one of his patients. This had deleterious effects on my own sleep and general wellbeing. We did this for a few months before I stepped back. And when I stepped back I realized the thing that is the reason that I have written this book. I didn't really have to do autonomic diagnostics on Eric's patients because all of them presented with a common

autonomic baseline.

There were individual variations in how they were sick, by which I mean the specific diagnosis (e.g., ME/CFS, Long COVID, Mast Cell Activation Syndrome, etc.), and the types of co-infections that most of them had (e.g., mold, Lyme Disease, etc.). But what all of them had in common were Autonomic Nervous Systems that had been pushed into, and were resistant to shifting out of, various formulations of lifethreat response. Some of these patients had this response blended with fight, some with flight, and some with sociality creating 'appease' or 'placating' autonomic states, but the common denominator for all was this shutdown response.

The second thing that all of them had in common was that there was not an immediate response to autonomic intervention, even if the intervention was appropriate. As in the Cell Danger Response, people in conditions of complex chronic illness were actually not sensitive to signals of safety from the Central Nervous System. Which is to say that, as distinct from a broad swath of people dealing with other kinds of stress-related issues, helping the nervous system detect safety was not enough to shift their autonomic baselines in real-time. The feedback loops from chronic lifethreat had simply moved other physiological systems too far in the direction of dysregulation.

This was frustrating both to the patients, and to myself, because we are used to seeing fairly immediate responses to neurological intervention in our work. But an important common feature of complex chronic illness is that it typically develops over decades. No one who is severely chronically ill becomes so in a short period of time. Complex chronic illness develops slowly through feedback loops that shift autonomic and metabolic baselines over long stretches of time, until a person's center of gravity shifts across a threshold into profound illness. And in our experience, their healing likewise takes significant time.

About a year after this initial foray into collaboration, Eric

interviewed me for a series he was putting together on chronic illness. In preparing for our conversation he read my book *Autonomic Compass: Finding Home in your Nervous System*, and when he came into the conversation had developed a clearer understanding about the lens through which we view well- and ill-being.

After this conversation it occurred to me that it would be useful to his patients, and to others with complex chronic illness, if I were to write up a straightforward account of how we view complex chronic illness through the lens of the Autonomic Nervous System, and therefore how someone with complex chronic illness might begin to think about the origin, progression, and eventual healing of their illness from the standpoint of the Autonomic Nervous System.

That is the handbook you are now reading ;)

This book is not a bunch of hacks, and it does not contain quick fix methods for 're-tuning your Vagus nerve' or recommendations about vagal nerve stimulators or other bullshit like that. Buying a vagus nerve stimulator without understanding Autonomics is like walking into a building that's on fire with a bucket of water, slowly pouring it over the temperature sensor of the thermostat, and walking back out again. Most people don't have a problem with their Vagus. Your life is on fire. That's the problem.

What I would like to do here is teach you how to put out the fire in your life. Implementing what I am describing here will probably take years, but I guarantee you that it will take place much faster than how long it took you to become this sick.

I'm gonna talk to you like we are having a conversation, because that's the way that I roll. My name is Gabriel. I am a connection phenomenologist, and neural cartographer, and the Developer of Autonomics, which up-ends several hundred years of classical neurology, and teaches people how to grasp

and move the deepest and most powerful levers that govern your moment-to-moment experience of wellbeing. I am the Founder of Hearth Science, and I have taught autonomic physiology internationally for the past decade. I led a global autonomic physiology study group for wellness professionals with five thousand members, have trained about twenty thousand wellness practitioners around the world, and the books and software platform that I architected have helped people in fifty countries internationally.

I am deeply expert in this terrain, but it is also quite personal for me. I recovered from complex chronic illness in my twenties and thirties, but come from a family where several other members have not. Complex chronic illness is, to a degree that is not generally recognized, relational. And this is because the Autonomic Nervous System, which is the neural architecture of the mindbody connection, governs the energy-processing templates that shape the way that we relate to one another. What this means is that the roots of most complex chronic illness are laid down in early childhood, when we are learning non-verbally how to relate to those around us: our family, our siblings, the social systems in which we are enmeshed. This learning is not cognitive at all. It is, rather, deeply felt. Primal: animal if you will.

It is often here, in early childhood, that the templates for our defensive responses get organized: how we defend ourselves against threat. And so this is where we will begin the business of attempting to understand complex chronic illness through an autonomic lens.

03- EARLY CHILDHOOD

Human beings are born hairless and helpless, and without the proper caregiving will simply die. The fact that you are reading this sentence means that someone did a whole lot of work to keep you alive. If you think broadly about the animal kingdom, the degree to which a human infant is helpless is rather remarkable. Reptiles hatch from eggs, and when they are born, typically their parents are long gone. They have to innately possess all of the capabilities required to survive from the moment they hatch. Even many other mammals are much more adept at survival than human infants. A baby horse can typically walk within five minutes of being born, whereas a human infant needs 12 months. From an evolutionary perspective, this is rather perplexing, until we recognize something interesting.

Other animals that have brains as complex as ours, and here I'm speaking about creatures with similar degrees of cortical enfolding, like whales and elephants, typically have a gestation period that is closer to two years. A blue whale gives birth 24 months after conception. An elephant gives birth 22 months after conception. The human brain and nervous system likewise require this kind of time period to develop, but the evolutionary paradox we face is that our heads are so large that if we were to be fully cooked inside of our mothers, our heads would be too enormous to make their way out of the birth canal and we would not succeed in being born.

Nature solves this problem in an elegant yet paradoxical way. Human infants can be conceived as having a 27-month gestation period. The first nine months of this take place in utero. The next 18 months of it take place in two phases outside of the womb. Anthropologist Ashley Montagu calls this 18-month period the "womb with a view." It is the most developmentally sensitive period of human life (after our foetal stage), because it is the time in which our sensory and auto-

nomic neurology is being completed and myelinated.

From a neuro-developmental perspective, a human baby isn't really born until the fontanelles close. Fontanelles are the sort of skylights in the skull that allows the cranium to slightly compress during the birth process, so the head can make its way out of the birth canal. There are two fontanelles. One is toward the front of the skull, one is toward the back of the skull. The first fontanelle typically knits closed at around three months of age, the second around 18 months of age. This closure of the fontanelles is contemporaneous with the completion of the infant's foundational neurological wiring. One of the insights of our research is that the myelination of critical autonomic systems is not complete until this point. In indigenous and ancestral cultures around the world, for the first nine months of life the infant is typically carried on the body of a caregiver skin-to-skin. Often they are never placed on the ground. The baby is essentially given a *womb with a view*. They are in touch proximity with a regulated caregiver, and the cultures understood that this developmental period was so sensitive that keeping the baby regulated was a crucial part of building the baby's brain and nervous system in ways that were required for flourishing. For this reason, in intact ancestral cultures, many people will nurse the baby. The whole point is to keep the baby in an optimal range of arousal. This comes from a profound understanding that the baby is still being formed neurologically at nine months of age. There is typically a transition, around the time the baby begins crawling, and for the next nine months, through the development of walking, the baby is still kept close and monitored closely as they move through the final 9-month 'trimester'.

Modern civilization has categorically and catastrophically failed to understand the significance of this 18-month developmental period. But if we are going to set our examination of the root causes of chronic illness on a firm foundation, this is where we have to start.

04- BUMPER STICKERS

There's a bumper sticker that reads, "We are not human beings having a spiritual experience: we are spiritual beings having a human experience."

If I was going to rewrite this through an autonomic lens, I would say that we are not material beings having an energetic experience, we are energy beings having a material experience. I am fairly well aware that to someone who does not live in California, this sentence might sound a little bit New Age. But that's not what I mean at all. When I say energy, I'm talking about energy in the E=MC2 sense of it. In the Einsteinian interconversion between matter and energy sense of the word. Your autonomic nervous system is the mechanism in the body that interconverts matter and energy: that translates the flows of energy that run through you into experiences that you can metabolize; or not. I didn't study infant development in school, and so I really had no idea how sensitive an infant nervous system was until my daughter was born. I remember her arrival vividly for a variety of reasons. One of them was the astonishing completeness of this tiny being who had suddenly arrived after nine months in my wife's belly. I remember holding her reverently in the room in the hospital where we were staying, and I remember watching her sleep. One of the things that I find remarkable about infants is their complete commitment to whatever they're doing. Whether it is smiling, or weeping, or pushing out a poop, the effort and the commitment are total. The activity engages their entire being: mind, body and spirit.

When my daughter was born, she was so sensitive that I watched her startle awake at the click of a camera shutter. When a shift nurse in a bad mood entered our room, she would begin to wail inconsolably. From the moment she arrived, she could absolutely sense the energetic temperature of anyone around her. If their energy was clear, loving, and con-

gruent, she would respond to this immediately. If a person approached her who was angry, irritated, frightened, sad, or upset, my daughter was immediately inconsolable. It became totally obvious that she was transparently feeling whatever energies were around her. She was picking up on the vibes.

This was not something she had to learn. It had nothing to do with cognition at all. And she could not tune it out. She had no defenses against feeling the vibrations of any beings nearby.

I am bringing this up, because at one point *you* were that tiny being. And although I have met a lot of humans in my nearly 50 years, I've never met one who was born into a totally enlightened family. All of us come in with that level of sensitivity, and then we are dropped into what my friend Shai Lavie calls *the nightmare of the nuclear family*. The challenge we have as tiny, extremely sensitive beings, is that we are often being cared for by people who do not understand the degree to which we are permeable to their energies, and have likely themselves suffered lifetimes of under-care and stress. This is a really major civilization-wide problem.

In the book that I am co-authoring with Darcia Narvaez, PhD, the developer of the Evolved Nest, we explore what is required to restore human nature (*Restoring Human Nature*). Any enlightened society, we propose, would place at its very center the mother-infant dyad, and organize all societal activities around the preservation of that relationship. Because if you want to build flourishing humans, you have to create the neurological conditions for building human wellness from the time the baby is conceived moving forward.

Sadly, it's not hard to see that our current incarnation of civilization so-called is not attending to caring for that relationship at all. Mothers are not supported during pregnancy. And none of our social structures are designed to prioritize their well-being, or the well-being of the family after the child is born. Instead, what happens for most of us is that we are taken home

to houses with stressed-out parents and siblings. In order not to die in these environments, we have to learn pretty young how to defend ourselves against the onslaught of energies in these environments. And so this is where most of us begin to learn the defensive autonomic responses that will accompany us for most of our lives.

The good news is that if you're reading this sentence, the strategies that you deployed worked. From the perspective of the Autonomic Nervous System, the primary objective is survival. So it is a non-trivial thing to congratulate yourself on that. The strategies that you developed succeeded in keeping you alive! Good for you.

Unfortunately, for many people, these strategies are pretty maladaptive. Especially if we get caught in them habitually. And if you're reading this book, I can pretty much guarantee you that at least some of your foundational defensive strategies laid the neurological groundwork for the chronic illness you are now experiencing.

05- SOUND ENGINEER

Before we get any deeper into the text, I need to explain to you how I see the Autonomic Nervous System. I need to give you a few metaphors so that you can hold it close at hand, and understand it less abstractly. Classical neurology divides your nervous system into a Central Nervous System, and a Peripheral Nervous System. The Central Nervous System contains your brain and spinal cord. The Peripheral system is everything that is branching off of that. That peripheral system contains two distinct nervous systems. One of them is the Somatic Nervous System, which controls voluntary muscle. When I reach down to pick up my cup of coffee, I am engaging the somatic nervous system. It is volitional, which means that I choose to move in a particular direction. I choose to pick up the cup, and bring it to my lips. Now I choose to swallow the beverage it contains. The other peripheral nervous system is the Autonomic Nervous System. That's the one that we're gonna focus on.

For most people who have ever heard of the Autonomic Nervous System, they associate it with automatic responses. One of the Autonomic Nervous System's primary jobs is to regulate the internal milieu, which is to say that it's doing all of the housekeeping functions in the body so that you don't have to think about them. This is the part of your nervous system that breathes your breath, beats your heart, digests your food. You'll notice that I'm not saying that you are the one who is beating your heart, breathing, or digesting your food, because it's truly not your ordinary sense of self that is doing these things. You could totally forget about them, and the Autonomic Nervous System will perform these functions in the background. So it's important from the outset to recognize that you have a distinct sort of autonomic self that is making decisions about how to run the body that is not the same as your ordinary sense of

identity.

The second function of the Autonomic Nervous System, which is the particular purview of my expertise, involves the way that it re-tunes your body based on the moment-to-moment detection of safety, danger, or lifethreat. My mentor Stephen Porges, PhD, the developer of the Polyvagal Theory, coined the term *neuroception* to denote this particular discernment in the ANS.

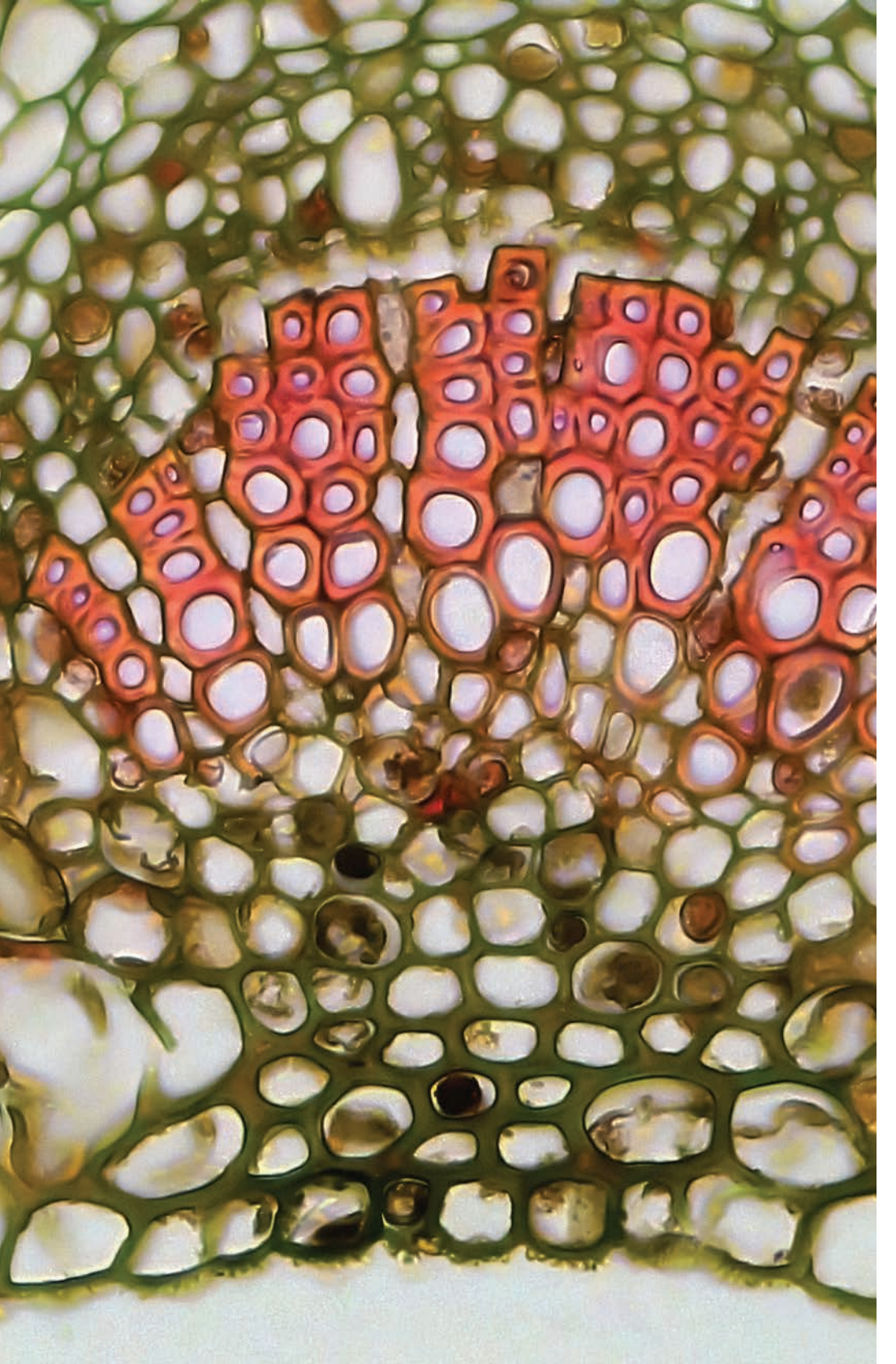
I find it useful to think about the Autonomic Nervous System as a sound engineer. If you've ever been to a recording studio, or watched a studio session where musicians are recording an album, you'll notice that there is a room where the musicians are performing, and then off to the side there is a sound booth that contains a sound engineer. The engineer is typically looking at a console that has a bunch of knobs and dials on it, and their job is to adjust the balance of sound coming out of the instruments and the vocals in order to create the feel that the producers want for the tracks. It's pretty useful to think of your Autonomic Nervous System as this sound engineer. What the Autonomic Nervous System is doing, moment-to-moment, is optimizing the levels of your physiology in response to internal and external environmental cues. This modulation is happening much more dynamically than most people realize.

To simply transition from lying down to standing up and not pass out, you have to change a lot of physiological parameters in the body.[1] In order to stand up, heart rate has to increase moderately, and the contractile pressure has to increase. Tiny muscles have to tense in the base of the skull so that too much blood doesn't flow out of the brain and you don't get lightheaded. There are all kinds of reflexive fine-tuning autonomic adjustments made in the process of shifting from horizontal to vertical. Thankfully, we do not have to think about any of this stuff. Our Autonomic Nervous System is doing it for us.

1 Breakdowns in this coordinating capability of the ANS can present as orthostatic hypotension or Postural Orthostatic Tachycardia Syndrome (POTS).

And so, the sound engineer of the Autonomic Nervous System is the process that is dynamically recalibrating all of these levels in real-time. If we boil all of this down to its most distilled form, the genius of biology lies in our ability to conserve energy. And so what the Autonomic Nervous System has to decide in every moment is how the balance of energy in the body will be deployed. The primary calculus it uses to do this is survival-based. This is to say that if there is anything in our internal or external environment that is a threat to our survival, the vast majority of our energy resources will be deployed to address that specifically. In the absence of a threat, if we can downshift those defensive systems, we have reservoirs of energy available for life-affirmative processes. The long story of our evolutionary histories, however, is that there is a lot of dangerous shit in the world. And when that dangerous shit is happening, the sound engineers of the Autonomic Nervous System are prioritizing our survival responses.

Something that's really important for you to understand at the beginning is the following: having our survival responses enduringly activated is fundamentally incompatible with well-being. If we spend more of our moments in survival states, we will inevitably become sick. It is simply too metabolically costly. The Autonomic Nervous System cannot chronically reside in detections of danger and lifethreat without you becoming ill.



06- SYNTHESIS

OK, so now let's synthesize the last few chapters... We are these tiny highly sensitive beings. We come home after being born, not fully baked (not even close), and most of us end up in a house with a bunch of dangerously stressed-out monkeys.

The tiny sound engineers in our Autonomic Nervous System, acutely aware of both safety and threat, are tasked with helping us survive, and getting our needs met. If we can be startled awake by the click of a camera shutter, and burst into tears when a nurse who is unhappy enters the room, you can be pretty damn sure that we notice if people around us are calm and at ease, or screaming their heads off.

Most people who are stressed-out around a crying baby do not have the wherewithal to realize that it's probable that the baby is crying because of them. The next time you find yourself holding a baby who is crying, you might experiment with seeing what happens if you can bring yourself into a state of regulation. Often, the baby will immediately settle. This is not to say that there are not plenty of times when the baby is crying because it's hungry, or hot or cold, or has gas: it is rather to note that babies have almost no boundary, and are extremely sensitive to the energy of others.

And so that baby, who is you, ends up in the house that you were born into, having to navigate the energy landscape of a number of other stressed out human monkeys, while shit happens. And guess what: this is how you begin to develop and wire defensive autonomic states. For many people, this is when the pathway to developing complex chronic illness begins.

07- ACES

When I started Hearth Science, our very first client was a woman named Dr. Nadine Burke, who was at the time the Medical Director of a pediatric clinic in the Bayview/ Hunter's Point neighborhood of San Francisco. Nadine, who would go on to become the First Surgeon General of California under Gavin Newsom, is a protégé of Dr. Vincent Felitti, the Co-Principal Investigator of the Adverse Childhood Experiences study, which is one of the most significant epidemiological studies of trauma ever conducted. At the time the study was implemented, Dr. Felitti was the Chair of Preventive Medicine for the Southern California branch of Kaiser Permanente in San Diego. He was running several preventive medicine programs, including an obesity clinic, and a smoking cessation program.

Twenty-something years later, when I would interview him for a masterclass series on Connection Science that I was hosting, he would distill the insight that catalyzed the ACES study down into one of the most memorable phrases I've ever heard a physician utter. What Felitti began to suspect, was that, "The problems that we found ourselves treating in public health ***were often the patient's solution to a much deeper problem that we could not see.***" By example, Felitti shared information with us about a couple of the cases that had catalyzed the study. One of them was a woman who had enrolled in the obesity clinic, and succeeded in losing about 200 pounds in a little over a year. He had been astonished: he did not know it was possible for a human being to lose weight that quickly. What then happened, however, was that the woman put all of the weight back on in less time than it had taken her to lose it. The catalyst for this sudden weight gain was her being approached and sexually propositioned by a colleague at work. What Felitti began to suspect was that the woman's weight was a costly yet effective

strategy to prevent her from garnering sexual attention, which recalled to her the unmanageable trauma of a history of childhood sexual abuse. ***Her obesity was actually not the problem, but rather the costly solution to a deeper problem that they could not see.*** What Felitti began to recognize was that in successfully treating the obesity, or the tobacco use, he was actually taking away his patient's primary coping strategy.

At a conference detailing the results of some of his work in preventive medicine, Felitti met Robert Anda, an epidemiologist at the Centers for Disease Control in Atlanta. Together, they conceived the study that would become known as the Adverse Childhood Experiences study. In the study, Felitti integrated ten questions about categories of early childhood abuse and neglect into an adult health screening questionnaire administered to patients at Kaiser in San Diego. By the time the study was complete, they had gathered data from 17,421 adults. The picture the study painted was stark. Two thirds of an adult population at a private pay insurer in Southern California had exposure to at least one Adverse Childhood Experience.

Furthermore, Felitti found a graded dose-response relationship between the incidents of early adversity, and the development of all categories of disease later in life, across both physical and mental health domains. The average age of respondents in the study was 57 years old, and most people were reporting on experiences that had occurred nearly 50 years prior. What the study showed us definitively was that the impacts of early childhood adversity endure. We are told that time heals all wounds, but in the case of traumatic exposures this is simply not true.

The reason that this is not true is that trauma creates enduring changes in our neurobiological setpoints. Stress is accumulated, and locked into the body through neurological and chemical alterations. If these are not addressed– if we cannot find a way to get back to neurological baselines, and clear the accumulated loads and chemistry, the body and mind are permanently

functionally altered.

Because of the way that the study was organized and framed, distinctions were not made between the types of stress responses that a child elicited in response to an early adverse experience. Yet what we know from our study of autonomic physiology is that two people can experience the same event, and respond to it in very different ways, by evoking completely different defensive survival responses. Some people love public speaking, and others are terrified of it. Two siblings can be in the room with parents who are arguing, have different interpretations of what happened, and be impacted in totally different ways. Our experience of events is highly contextual, and contingent upon our own nervous systems. This is why we often say in the field of trauma healing that ***trauma is in the nervous system, not the event***.

If we could re-author the ACES study with the use of wearable autonomic diagnostic tracking tools that happened to be on the children at the time of their exposure to adverse experiences, we could more successfully quantify the types of allostatic loads that various exposures to adversity have on the human body. Because overwhelming experiences put us into autonomic survival responses, and because these responses re-tune the body in characteristic ways, causing us to accumulate quantifiable levels of stress, a more algorithmically sophisticated version of the study could show us the particular ways that early events impact a specific child going forward. Yet Felitti's study was slightly more anecdotal. There was no biometric measurement around the inciting incidents.

Yet what still became patently obvious was that a much larger percentage of the population than previously recognized had exposure to early traumatic events, and their impacts were enduring throughout the lifespan. This is important for us to understand when we are thinking about chronic illness through an autonomic lens, because it validates the notion that the roots of these kinds of diseases often reach back to early child-

hood.

Again, something that's foundational to thinking about chronic illness through an autonomic lens is likewise the recognition that the most important determinant of illness is not the event– it's not specifically what happened– it is how our particular autonomic nervous system responded to that overwhelming experience. This might seem counter-intuitive at first, especially because most of us are pretty identified with our stories about what has happened in our lives, and why we have become the way that we are. But if we're going to dig down to the layers at which transformation can happen, it is important for us to understand the degree to which our focus should be on the way that the autonomic sound engineer has altered or re-tuned our nervous system, more than the specific music that was playing when this happened. Talk therapy is wonderful, and having insights about our own histories is very important, but neither of them moves the needle on the actual physiological processing of overwhelming experience, and this is where you want the needle to move if you are seeking healing.

Take a moment and think about the ways that various people you know might respond to the same stressor in different ways. I can think of situations where something stressful has happened in the life of my family, and it made me angry, made my wife anxious, and made my daughter sad. All of these responses are autonomic, and all of them are valid responses to threat. Both my wife's response and my own are undergirded by what traditional neurology calls the Sympathetic Nervous System. They also primarily involve the biochemistries of adrenaline and cortisol. But my fight response, whose emotional correlate is anger, and which is designed to directly confront a threat, feels very different than my wife's flight response, whose emotional correlate is fear, and whose purpose is to get her away from a threat. These are both distinct from my daughter's response, which involves a different autonomic pathway, is more concerned with becoming socially invisible, and is mediated by the biochemistries of endogenous opioids.

I'm not placing any particular value judgment on one response or the other: I'm just noticing that these are three different adaptive responses to a threat with entirely different felt qualities (anger, anxiety, sadness) undergirded by differing neurology and neurochemistry. Beyond our three responses, a fourth person might respond by appeasing, and a fifth by placating.

Part of developing autonomic fluency is knowing how our particular nervous systems respond to stressful events. If you have developed complex chronic illness, we already know something about this, because these kind of illnesses only develop when a person habitually responds to stressors with a specific subset of autonomic defensive responses.

What I'd like you to take away from this chapter on ACES is the awareness that early experiences of adversity that push the Autonomic Nervous System into defensive states have enduring impacts on well-being over the lifespan. In addition, the specific autonomic energy processing templates that our nervous system evoked to respond to threats govern the kind of illness that we may develop over time. Beginning to understand why our specific autonomic nervous systems respond to survival threats the way that they do is the first step in moving towards transforming these responses.